APR 4 1941

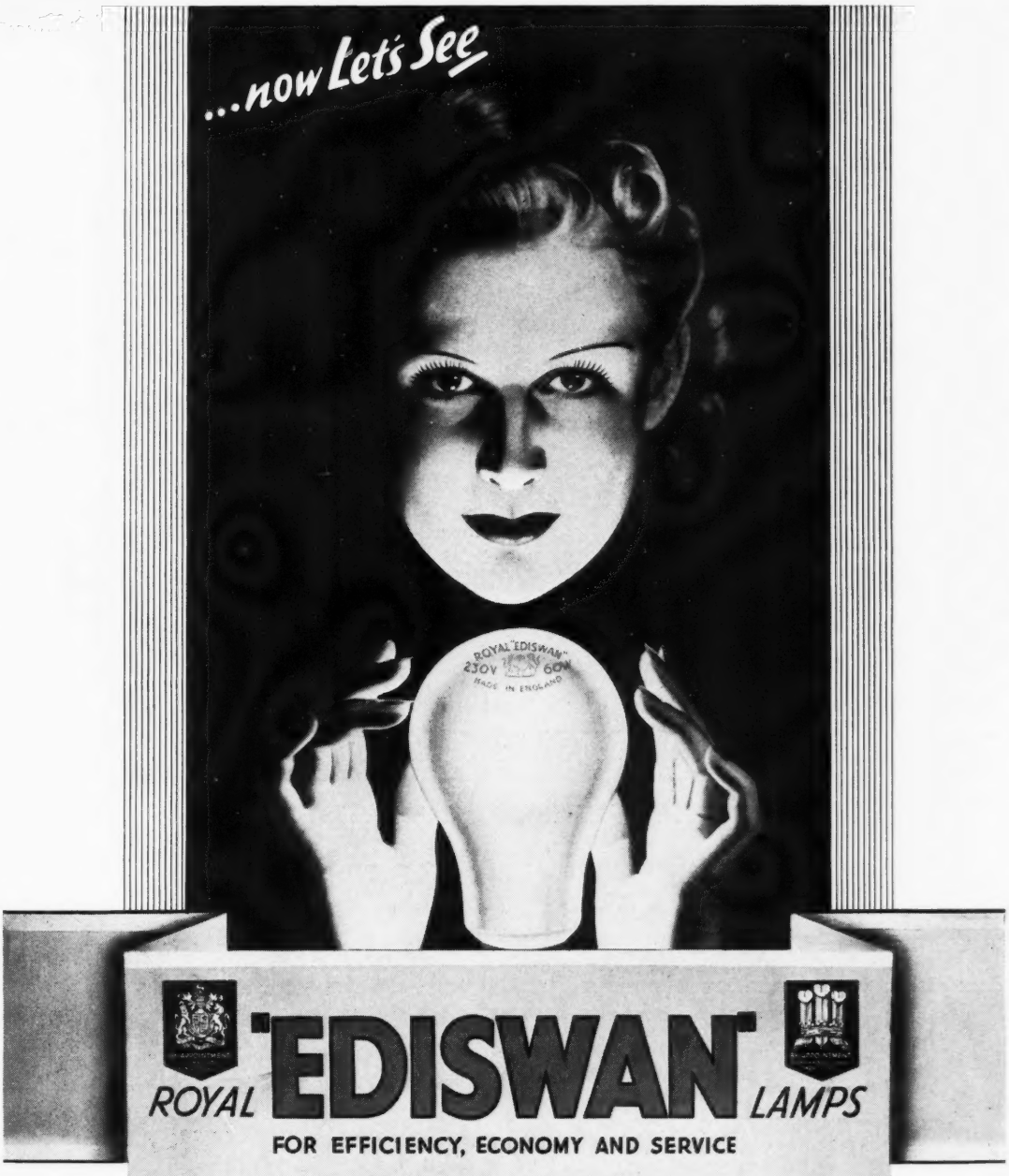


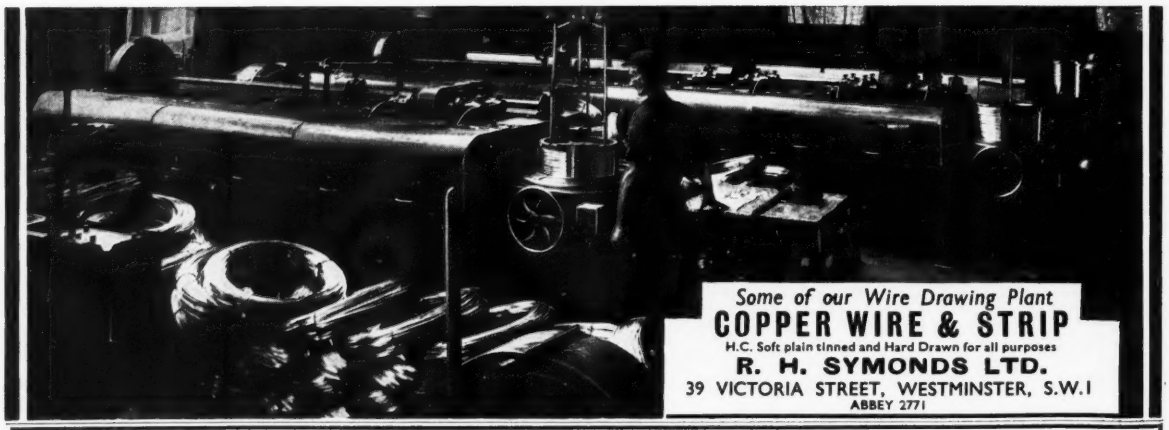

# ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXVIII. No. 3302 MARCH 7, 1941 SIXPENCE




...now Let's See
ROYAL "EDISWAN"
230V 60W
MADE IN ENGLAND
ROYAL "EDISWAN" LAMPS
FOR EFFICIENCY, ECONOMY AND SERVICE
THE EDISON SWAN ELECTRIC CO. LTD., 155 CHARING CROSS ROAD, LONDON W.C.2


Some of our Wire Drawing Plant
COPPER WIRE & STRIP
H.C. Soft plain tinned and Hard Drawn for all purposes
R. H. SYMONDS LTD.
39 VICTORIA STREET, WESTMINSTER, S.W.1
ABBEY 2771

MICA

WASHERS
DISCS
CONDENSER PLATES
ELEMENT STRIPS
DIAPHRAGMS
STOVE PLATES
RAW MICA

BRITISH MICA Co LTD ~ BEDFORD

Tel. Address: "CLIFFORD, BIRMINGHAM"
Telephone: MIDLAND 2152 (P.B. Ex.)

ESTABLISHED 1776

SEA-CLIFF

TRADE MARK

CHARLES CLIFFORD & SON LTD.
BIRMINGHAM

*Contractors to Admiralty, War Office, and Principal Railway Companies*

—: Manufacturers of :—

COPPER, BRASS AND PHOSPHOR BRONZE
SHEETS, TUBES, RODS AND WIRE

PHOSPHOR TIN 5%, and PHOSPHOR COPPER 10% and 15% Phosphorus

H.C. COPPER BUSBARS and STRIP
MANGANESE BRONZE, YELLOW METAL and NAVAL BRASS
TIN, LEAD, ZINC, and COMPO WIRE and STRIP
Chill-cast PHOSPHOR BRONZE BARS, Solid and Cored. "Sea-cliff" Brand

PRECISION STAMPING - GAUGING - MACHINING

MICA and MICANITE

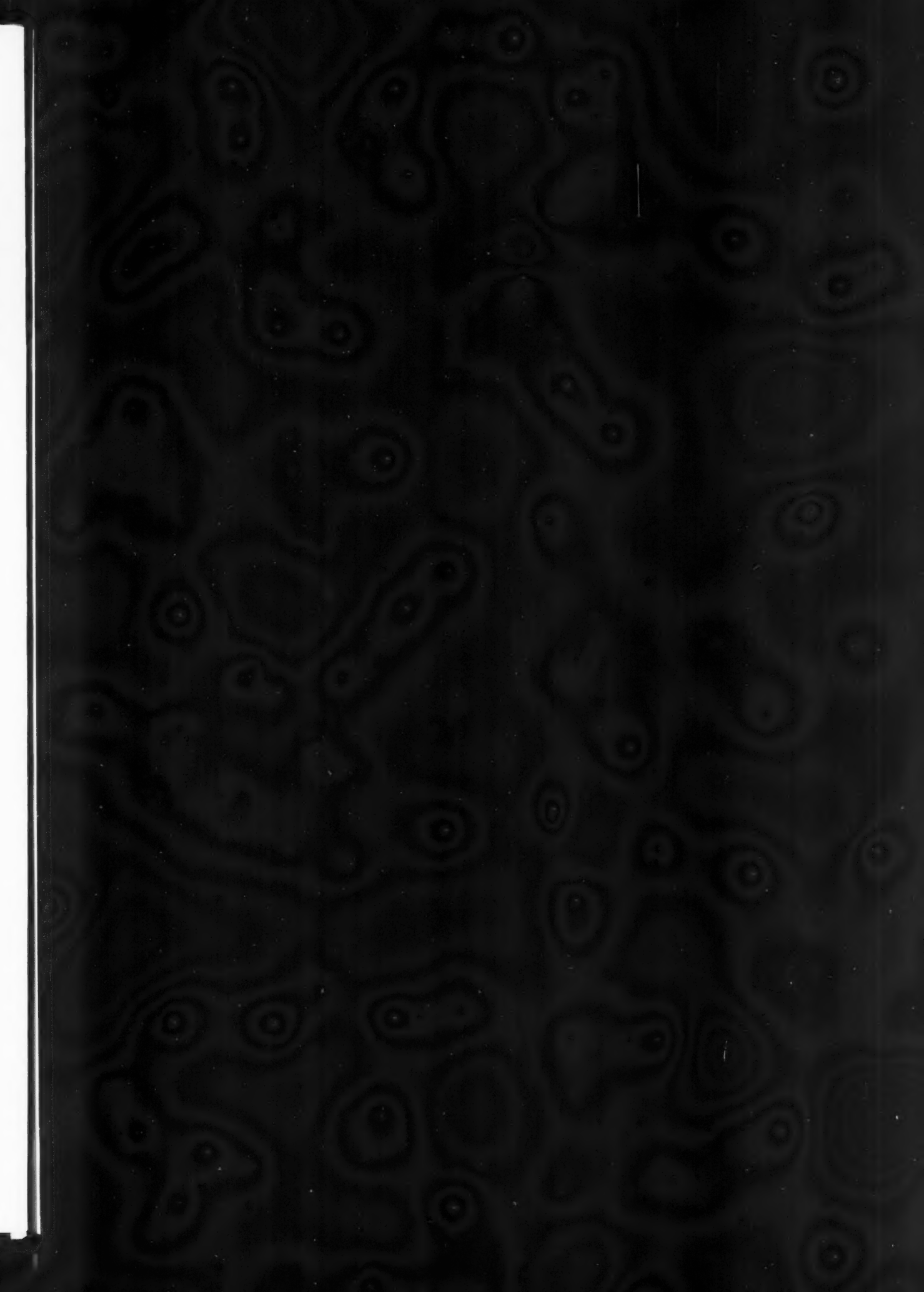
INSULATORS for ELECTRICAL WORK

Grams "MICAVLOR LONDON"

TAYLOR & PETTERS, LTD.
INSULATION ENGINEERS
3/11, WESTLAND PLACE, CITY ROAD, LONDON N.1.

Phone CLERKENWELL 4105

MICA BRIDGES for RADIO VALVES



Engineering Lib.
Eaton

THE
# ELECTRICAL REVIEW

Volume CXXVIII — No. 3302

Friday, March 7th, 1941

## Contents


| | Page | | Page |
|---|---|---|---|
| Editorial—Factory Conditions | 429 | Fluorescent Lighting | 439 |
| Modern Brickmaking | 431 | Recent Introductions | 441 |
| Correspondence | 433 | Commercial and Industrial News | 442 |
| Battery Vehicles | 434 | Earth-fault Protection | 443 |
| Personal | 435 | Electricity Supply | 444 |
| Accumulator Storage. By A. F. Davis | 436 | New Patents | 445 |
| Farm Wiring. By T. C. Gilbert, A.M.I.E.E. | 437 | Financial Section | 446 |
| The London J.E.A. | 438 | In the Courts | 447 |
| | | Contract Information | 450 |

Classified Advertisements (Official Notices, Situations Vacant, etc.) - - - - - 43
Index to Advertisers - - - - - - - - - - - 66


EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: Dorset House, Stamford Street, London, S.E.1
Telegraphic Address: "Ageekay, Sedist, London." Code: A B C. Telephone No.: Waterloo 3333 (35 lines)
Subscription Rates, Postage free: United Kingdom, £1 16s. 10d.; Canada, £1 12s. 6d.; Colonial and Foreign, £2 1s. 6d. per annum
Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW LTD., and crossed "Lloyds Bank"

HERE'S A SOLUTION TO YOUR PROBLEM

Each Rawlplug Technical Specialist has spent many years studying Fixing problems and is therefore well able to advise you on the subject. He is backed by works technicians and the research facilities of our own laboratories. An appointment can be arranged with one of our specialists by writing to the address below.

If your problem does not require the special attention of a Representative, make sure you have at hand a copy of our 24 page brochure "Fixing Devices that grip the World." And if you are further interested in fixing problems you can obtain, free, a copy of our 216 page Technical Handbook "Modern Fixing Practice" by applying on a trade letter heading.

CALL IN A RAWLPLUG TECHNICAL SPECIALIST

THE RAWLPLUG CO. Ltd.
Rawlplug House,
Cromwell Rd., London, S.W.7

360

REMEMBER!

Berry's SWITCHGEAR

THERE IS HARDLY A BRANCH OF THE WAR EFFORT IN WHICH BERRY'S IRONCLAD SWITCHGEAR IS NOT TAKING A HAND.

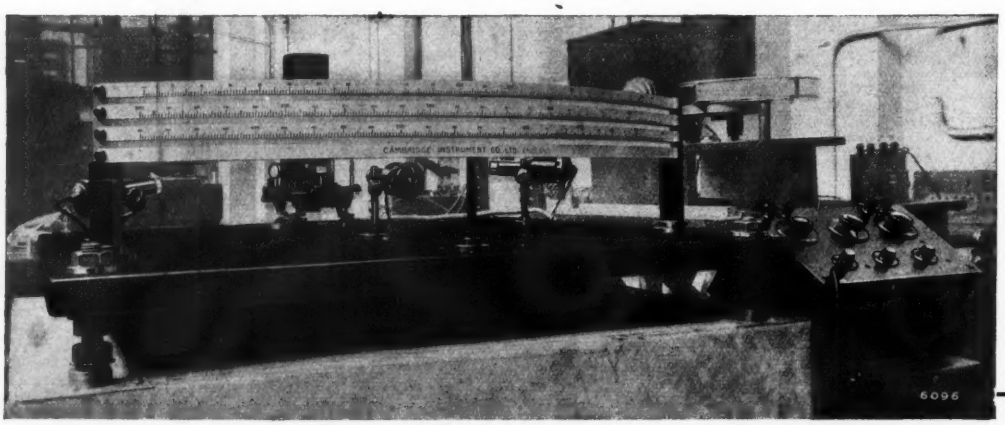
AIRCRAFT, SHIPS, BOMBS, SHELLS, CAMPS, HOSPITALS, SHELTERS, ETC.

Berry's SWITCHGEAR HAS BEEN INSTALLED IN CONNECTION WITH ALL THESE DURING THIS WAR, AS IN 1914-1918.

Berry's ELECTRIC LTD.

LONDON - - NEWMAN STREET, W.1
BIRMINGHAM - IRONCLAD WORKS, HALL GREEN
MANCHESTER - LLOYDS STREET
NEWCASTLE - 55 NEW BRIDGE STREET

# CAMBRIDGE REFLECTING WATTMETER



FULL DETAILS IN LIST 161D-X

**The N. P. L. are using three**

of the Cambridge Standard Wattmeters illustrated, for testing the sub-standard meters submitted for certification in accordance with the regulations under the Electricity Supply (Meters) Act, 1936. These instruments are also installed at Sheffield and other large undertakings.

*(See "Electrical Review," January 17, 1941, page 245.)*

A Universal Reflecting Dynamometer of similar design is available.

| Watts (Instrument) (full scale) | | Current Ranges (Range box) amperes | | Pressure Ranges (Range box) volts | | Period Un-damped | Accuracy of Calibration | Error on Unity Power Factor |
|---|---|---|---|---|---|---|---|---|
| High P.F. | Low P.F. | Normal | Max. | Normal | Max. | | | |
| Nominal 500 Actual 650 | Nominal 100 Actual 130 | 0.5<br>1<br>2.5<br>5 | 0.75<br>1.5<br>3.75<br>7.5 | 50<br>100<br>200<br>250<br>300<br>400<br>500 | 75<br>150<br>300<br>375<br>450<br>600<br>750 | 5 secs. | 0.05% over top ¾ of scale Temp. Coeff. less than 0.005% per °C. | At frequencies between 25 & 100 C.P.S. Less than 0.05% |

CAMBRIDGE INSTRUMENT COMPANY LIMITED
13 GROSVENOR PLACE - LONDON - S.W.1

THE
# ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER —— ESTABLISHED 1872

Vol. CXXVIII. No. 3302 MARCH 7, 1941 Price SIXPENCE

# Factory Conditions

## *Relative Importance of Various Factors*

WHAT should be looked for in the annual reports of various official bodies is not so much a record of events as an indication of the way in which improvements may be made in the existing scheme of things. This is of particular moment with regard to the safety of workers in industry and never more so than now when so many people are employed in the factories for the first time and have not the same instinctive awareness of risks as have those of longer experience.

Exaggerated ideas seem to be entertained in many quarters regarding wartime accidents and we therefore welcome the issue of the annual report of Col. A. W. Garrett, Chief Inspector of Factories, for 1939 which puts matters in their proper perspective and which, although (for quite understandable reasons) somewhat behind the times, is not on that account out-of-date in many of its most important aspects.

### Electrical Aspects

The more directly electrical information contained in this report was given by us last week but, although useful as far as it goes, it is not enough to compensate for the non-appearance of " Electrical Accidents," with its constructive suggestions for the prevention of mishaps, which the Senior Electrical Inspector, Mr. H. W. Swann, has prepared for a number of years. However, great as the technical interest of this publication may be, its subject cannot perhaps be regarded as of the same urgency at the moment as the many other duties that are referred to in the report as having occupied the attention of the Electrical Branch since the outbreak of war. We say this because the number of accidents in factories that can be attributed to electricity is only about 0.25 per cent. of the total. Still, we hope that circumstances will soon permit of a resumption of publication.

One of the chief items from the electrical viewpoint to which Col. Garrett and his staff refer is the effect of the " black-out " on the health and safety of operatives and on their output. This effect has, generally speaking, been adverse. Some attribute this to working night and day by artificial light owing to the semi-permanent nature of the black-out methods adopted. There would appear to be little substance in this contention, at least with regard to its physiological aspects, provided illumination is adequate in quantity and free from glare—a view that receives support from investigations made by the Departmental Committee on Lighting in Factories last year. Other factors, such as working under war strain for long hours (especially among those unaccustomed to industrial conditions), unsuitable air temperatures and humidity and poor ventilation, are likely to be far more potent.

### Better Ventilation Needed

From the evidence before us, it would appear that the greatest single cause of unsatisfactory conditions is that, in the hurried efforts to prevent the emission of light from buildings, natural ventilation was obstructed to a harmful degree. A pamphlet issued by the Department entitled " Factory Ventilation in the Blackout " gives some practical advice on the construction of light traps at ventilation openings, but even these are liable to reduce the free flow of air, possibly to half as much as that ordinarily desirable.

Where forced ventilation has been introduced by the installation of electrically-driven fans associated with heating elements on the plenum system, matters have been considerably improved. Apart from air changes, it is important that air movement should be sufficient at all points in the works to prevent stagnancy and undue humidity. Electric " unit heater " systems with fans, which have the advantage of being easily installed without occupying useful space, are being favourably spoken of in this connection.

A solution of the problem of providing adequate mechanical ventilation and air treatment in all cases would very appreciably reduce the importance of the psychological considerations. By all means, let there be as much daylight in the works as possible, partly with a view to obtaining the highest standard of illumination, but the material conditions must be right

first of all. Incidentally an increased use of fluorescent lamps in industry is likely to promote satisfaction among workers as giving them a light that is close in colour to the daylight to which they are accustomed.

In any event, the spirit shown by the uncomplaining acceptance of unfavourable working conditions in wartime, to which Col. Garrett refers, will of itself tend to reduce the importance of psychological factors, so long as proper regard is paid to such elementary physical matters as ventilation.

**War Damage**

THE Government's War Damage Bill, after considerable amendment, passed its third reading in the House of Commons last week. In his concluding speech, the Chancellor of the Exchequer referred to the position of public utility undertakings with which, he said, it had not been possible to deal fully in the Bill. He promised, however, that no time would be lost in presenting to Parliament proposals for meeting their special case. There were to be further consultations with the interests concerned, and any proposals evolved as a result would provide that the utility undertakings should make suitable contributions as a necessary counterpart to the grant of appropriate compensation. In the meantime payments would be made towards the cost of works certified to be urgent. The Joint Committee of Electricity Supply Associations has the matter under consideration and has made certain suggestions to the Electricity Commissioners.

**Laying up Accumulators**

BATTERY makers have always warned users against over-discharging the cells and some of our readers may be surprised at one of the methods described in this issue of putting accumulators out of service. There is, however, a real distinction between a single controlled discharge to zero and repeated exhaustive discharges. In the latter, sulphation of the plates is not uniform and the current density on recharging is not the same all over the surface, thus causing irregular expansion and hence distortion. An advantage claimed for the method is that complete sulphation of active material prevents adverse hydrate action and enables the plates to be stored indefinitely without harm. Preference is generally to be given to the other method mentioned in the article, but it is essential that the plates should be kept bone dry; otherwise chemical action may be set up, possibly resulting in the whole of the active material cleaving from the lead base. Much depends upon the composition of the negative Planté plates, and when in doubt it is advisable to consult the manufacturers concerned.

**The Bradford Appointments**

AFTER much discussion and vacillation, the question of the Bradford appointments seems to be on the way to settlement. Mr. W. Dundas has now been definitely appointed city electrical engineer and manager, in succession to the late Mr. T. Roles, and apparently will have complete charge of the Electricity Department. It had previously been half decided that there should be dual responsibility on the engineering and business sides of the undertaking—not a very satisfactory arrangement. Instead of this it is now proposed that a deputy electrical engineer and manager should be appointed at a commencing salary of £850, rising to £1,000, and that there should be in addition a commercial manager at £800, rising to £950. The latter official will be responsible for the efficient control and administration of the commercial side of the Department, including all sales and development work, collection of accounts, etc., and will be expected to make reports and recommendations to the city electrical engineer from time to time. It is well, we think, to have one head of an undertaking whether he be technical or commercial; two on an equal plane will be likely to consider their own branches all-important which is not conducive to the best results.

**Farm Grinding**

USUALLY on British farms a plate-type mill is used for grinding feeding stuffs. Its load factor is poor as it may be used for only a few hours a week, during which time attendance is required for adjusting the plate pressure. Experiments carrried out by Messrs. W. H. Cashmore and C. A. Cameron Brown on behalf of the Electrical Research Association show that a relatively inexpensive 8-in. hammer mill driven by a 3-HP motor can be run through the night without attendance to supply 3 to 4 tons of ground meal per week, which is enough for most farms. The unit is controlled by a time-switch in conjunction with a grain feeding unit, the meal being blown through a pipe to bins. The improved load factor is of advantage to both the farmer and the supply undertaking, while the saving in iron, steel and copper is of national benefit. The method is new to this country, but it would appear from the thirty-page illustrated report (which can be obtained from the Association (Ref. W/T4) for 2s. 10d. post free) that it is likely to keep its place in future practice here.

**Overseas Trade**

THE decision of the Board of Trade to suspend the publication of the monthly return of imports and exports is disappointing but no doubt necessary. The reason given is that, even in their emasculated form, the figures are likely to provide useful information to the enemy and although this may seem a little far-fetched it is surprising how often the combination of apparently harmless items can be made to yield valuable data. From the electrical point of view it is a pity that the encouragement given by the continued maintenance of exports of goods and apparatus should be withdrawn but we will hope for an early return to the full statements of peacetime.

**Bristol Trams**

WHILE the abandonment of tramways may be considered a sound peacetime policy, war conditions make the desirability of their conversion problematical. The Bristol Tramways & Carriage Co. has steadily proceeded with the replacement of trams by motor buses and a year ago had done this to the extent of 75 per cent. of the whole system. The change-over was retarded during 1940 but the company is now to operate omnibuses only in the city. At the same time the chairman informed the shareholders at the annual meeting last week that due to the restrictions upon petrol supplies it had been necessary to cut down the company's ordinary services to about 70 per cent. of normal.

# Modern Brickmaking

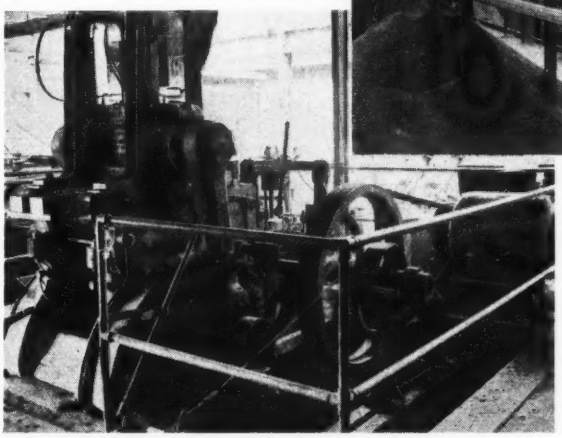
## *Processes Revolutionised by Electric Drive*

IT is probably safe to say that the older an industry is the greater is the difficulty in introducing into it modern methods of production. The more familiar one is with the processes of the older industries and their innate conservatism the less does one expect to find fundamental changes, and we were certainly surprised recently when we visited a modern clayworks in Nottinghamshire, with a picture of pit-pug stirring and hand moulding still fresh in our mind. Instead, we saw another expression of the versatility of the electric drive in modern factory line-production methods from quarry to kiln, and the old term "brickfield" seemed no longer to have a meaning.

*At first sight a brickfield does not seem to be a promising subject for electrification, but this article shows how it can be done with considerable success*

The works also emphasises particularly the outstanding feature of modern electricity supply—availability where it is wanted—for the essential point about this works is the existence on site of a high-quality marl. This material is quarried by side-working into a hill and we saw operations on the present vertical quarry face about 45 ft. high. At the top the marl is dug out by compressed-air-operated picks and spades and at the face by compressed-air drilling and blasting. A supply of compressed air at 100 lb. per sq. in. for these operations is afforded by a 27-cu. ft. per min. Ingersoll Rand compressor with a 35-HP "Tork" motor drive and 2-to-1 reduction V-belt transmission.

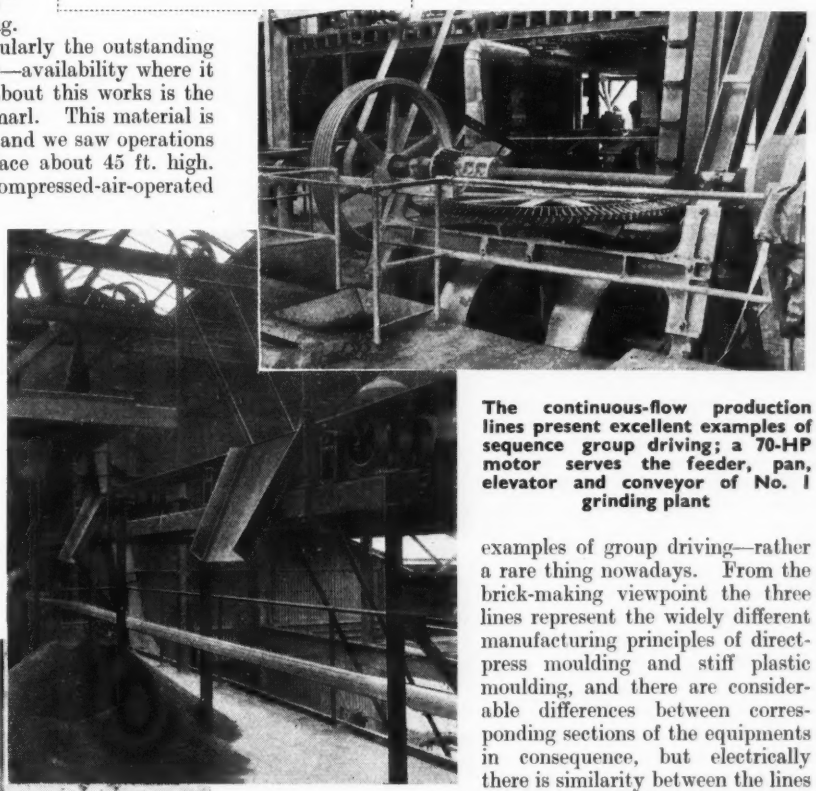
For conveying the marl to the works proper, about 100 yards from the quarry, the installation of a 36-tons per hour haulage system is now nearing completion. It is designed for operation on the endless-chain principle, sending empty tubs out as it hauls full ones in on a narrow-gauge railway.



**With a 10-HP drive each direct press has an output of 4 tons of clay goods per hour**

The above-ground terminal chain wheel on the vertical shaft of this plant is served by underdriven gear housed in a pit approximately 6 ft. deep. From the 7-in. pulley of the 7-HP, 710-RPM "Klosd" motor there is short multiple V-belt transmission to the 15-in. pulley of a countershaft with a worm which engages with the spur wheel of the vertical shaft of the terminal chain wheel.

There are three production lines in the factory, each embracing the three main processes of grinding, sieving and moulding on the continuous-flow principle, with various conveying and elevating systems to link up the essential operations. The sequence dependence of various operations on the preceding ones in these continuous-flow lines is responsible for some excellent



**The continuous-flow production lines present excellent examples of sequence group driving; a 70-HP motor serves the feeder, pan, elevator and conveyor of No. 1 grinding plant**

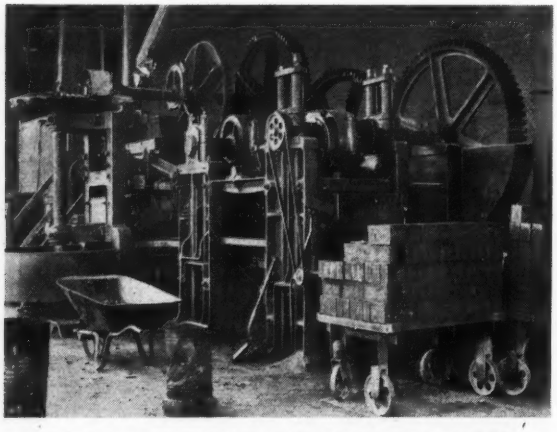
examples of group driving—rather a rare thing nowadays. From the brick-making viewpoint the three lines represent the widely different manufacturing principles of direct-press moulding and stiff plastic moulding, and there are considerable differences between corresponding sections of the equipments in consequence, but electrically there is similarity between the lines as a whole, so that it will be sufficient to describe one line and merely to refer to the points of difference in the other two.

**From each of the steel band conveyor delivery points the ground material is chute-fed to the appropriate direct press**

No. 1 line employs the direct press moulding method and the marl from the quarry is first tipped into a short horizontal heavy worm feeder just below floor level serving the 11-ft. diameter dry grinding mill. This mill revolves in the horizontal plane and in doing so drives by face reaction with the dead plates in the mill two vertically disposed grinding rolls, each weighing 2½ tons, one on either side of the vertical central mill driving shaft, between which and the dead plates the material is ground. The mill is fitted with two rows of inclined perforated plates between the centre dead plates and the outer rim. The revolving action of the mill distributes the ground material over the perforated plates and it falls through the perforations into a stationary

flat plate from which it is collected and delivered to a belt bucket elevator by under-scrapers fitted to the framework carrying the perforated plates.

At a point about 20 ft. above floor level the bucket elevator discharges the ground marl on to a double piano-wire



**The stiff plastic press in No. 2 line has an output of 10 tons of clay goods per hour**

inclined screen, the tailings from which are returned via a system of chutes to the grinding pan for further treatment. The fines from the screen are fed on to an endless steel band conveyor about 20 ft. long, single length, from which the material is taken off at any or all of the three feeding points for three direct brick presses immediately below at floor level. The grinding pan, the bucket elevator, the steel band conveyor and the initial feeding screw are all components of the first sequence group drive.

The capacity of the grinding plant is twelve tons per hour and the auto-synchronous pipe-ventilated driving motor is of 70 HP, 750 RPM. The first power transmission is by a heavy multiple V-belt, affording a 3-to-1 reduction from the motor to a horizontal shaft which engages the vertical pan shaft through bevel gearing with a further 7-to-1 reduction. From the horizontal shaft there are also flat-belt transmissions to the elevator driving pulley at the top, the steel band conveyor and the initial screw feed for the unground marl

### Moulding Presses.

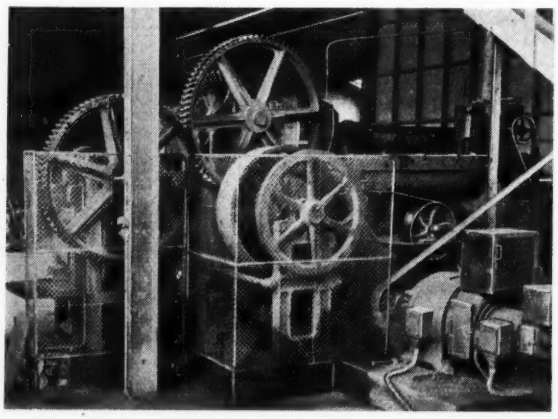
From each of the steel band conveyor delivery points the material is chute-fed on to the brick-press feeding carriage, a horizontal table, the forward movement of the reciprocating action of which passes the marl into the moulding box in which the brick is moulded by means of a vertical ram. Each press will mould 4 tons of bricks per hour and is driven by a 10-HP " Klosd " motor. Apart from slight differences in the speed characteristics the driving arrangements for all the presses are similar, and to cite one instance there is a 5-to-1 speed-reduction V-belt transmission from the 10-HP motor to the horizontal shaft of the press, from which the two main operations of horizontal feeding and vertical pressing are served by simple but heavy gears.

The second and third production lines both embrace stiff-plastic moulding, but in both cases the grinding plant is similar in all respects to that of the first line, except for the omission of the steel band conveyor drives and, in consequence, smaller motors, 60-HP, are used. The grinder motor of the second line is fitted with oil filters for the air circulation system, while the corresponding motor for the third line is pipe ventilated. The screens for the second and third production lines are of the inclined perforated-plate type and the requirement of only one feed to the press below in each case explains the absence of a conveyor.

The moulding plant in No. 2 line is another good example of group driving, the equipment comprising two main components for the processes of pug mixing and moulding proper. It is a stiff plastic brick press and re-press with an output capacity of 10 tons per hour. The material from the screening plant is chute-fed down into the double-shafted mixer of the pug-mixing component of the equipment. The mixing shaft revolves in a trough-like housing into which water is sprayed during the operation. Through a single-shaft mixer in line with the double-shaft one the mixture is passed on to the " pug " of the moulding plant proper. Knives on a vertical shaft in the " pug " screw-feed the mixture into the mould recess of a clod-moulding table which revolves in the horizontal plane immediately beneath the " pug."

After about three-quarters of a turn of the table the clod is ejected from the mould by an upward plunger operation. Then a level arm above sweeps the clod off the table on to the press proper where an eccentric-operated ram applies very heavy pressure to compress the article. A second and similar press operation is more in the nature of final shaping, while the makers' name is also impressed on the goods. This combination of pug-mixing and pressing plant is driven by a 75-HP 750-RPM auto-synchronous motor fitted with oil filters in the air-circulation system. There is a 7-to-1 reduction V-belt transmission from the motor to the main shaft of the press plant from which heavy gears operate the eccentrics of the presses. From an extension of the motor shaft there are V-belt and flat-belt transmissions to the various components of the " pug " mixing section of the plant.

The moulding plant in the third production line is similar to that of the second line, except that the pug mixer is of the single tandem-shaft type and there is no re-press. The driving motor is a 60-HP 750-RPM auto-synchronous machine. This plant has an output capacity



**The driving motor for the No. 3 line press is a 60-HP, 750-RPM auto-synchronous machine with oil air filters giving an output of 5 tons of clay goods per hour**

of 5 tons per hour, and at the time of our visit it was engaged on the production of electric cable protection covers. For the moulding of special products there is a small auxiliary press with an output capacity of about 4 tons per hour. It has a simple drive from a 5-HP motor with V-belt transmission to the gear shaft.

From all the production lines the moulded articles are passed on to the kilns for burning. In addition to several intermittent down-draught kilns there is a Staffordshire continuous kiln which consists of twenty transverse arched chambers within the long main structure. A flue system interconnects all the chambers, and by damper control any chamber can be closed or opened to the passage of the hot flue gases. In this way, while actual burning may be taking place in some of the chambers, in other chambers

bricks may be cooling down or in the process of being stacked into or discharged from the chamber.

When a chamber has been stacked and the door sealed the appropriate dampers are opened and the hot gases passed through the chamber. When the bricks have heated up to about 600 deg. C. coal is fed into the chamber through small holes in the kiln arch so that it actually mixes with the specially stacked goods and, on ignition of the coal, the actual burning operation takes place, reaching a peak temperature of about 960 deg. C. The complete kilning operation of heating up, burning and cooling, takes about 18 days. The flue system of the kiln is served by a continuous-running fan driven by a 20-HP 1,460-RPM motor with V-belt 3-to-1 speed reduction transmission, and apart from short stoppages for brush attention, this motor had been running continuously, 24 hours a day, for about 3½ years.

All the motors throughout the installation are of Crompton Parkinson production and are mostly slip-ring induction machines. Rotor resistance drum-type controllers are mainly employed, most of the starting equipments being Ellison or Allen West products. In nearly all cases the starters are fitted with emergency stop push-buttons.

In a substation on site, supply is received from the Derbyshire & Nottinghamshire Electric Power Co. at 11,000 V and is transformed to 440/250 V for the works power and lighting distribution and for local supplies by a 350-kVA transformer. The e.h.v. switchboard is a simple Ferguson Pailin in-and-out steel-clad equipment with a central transformer panel, and from the totally enclosed 440-V distribution board in the substation two feeders provide the actual works supply. Both feeders terminate at one central distribution point in one building of the works, but on one feeder at this point there is an Ellison oil circuit-breaker for the control of bulk transmission to the other building. The other feeder is connected to the busbar chamber of Glasgow Rex switch-fuse units on an angle-iron frame. Works distribution to the motors from these units is by v.i.r. cables in screwed conduit.

Our thanks are due to the proprietors of the works for permission to publish this description of their installation and to take the photographs from which our illustrations are reproduced.

# CORRESPONDENCE

*Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions.*

### Maintenance Men

WITH reference to the qualifications of the maintenance man mentioned in your editorial of February 21st, I entirely agree that it is foolish to wait until the war is over before we tackle the problem.

As chief electrical engineer in a factory employing about twenty-five electricians, I have been surprised to find the limited knowledge possessed by so-called electricians, of whom I must have interviewed nearly a hundred during the past three years. Very few men can draw the star and delta connections of a three-phase motor, can explain how to test for a short-circuit in a winding, or state how they would vary the speed of a DC shunt motor. The majority are aware how to reverse the direction of a three-phase motor, but cannot explain why the motor runs in the opposite direction when two lines are changed over.

It seems to me that there is a definite lack of the right type of technical instruction available. The evening schools should run a class giving instruction in " practical theory " and not regard the matter purely from an examination viewpoint ; after all, it is necessary to be expert in mathematics to gain a National or City and Guilds Certificate and this alone rules out a large number of good practical men. The only subject approaching the ideal is " Utilisation of Electric Power " which, strangely enough, is included in the syllabus for mechanical engineering students.

There are many men who have been displaced from the contracting industry who could be usefully absorbed in the factories at the present time providing they could receive a course of instruction in AC and DC motors and control gear, machine tool applications, power factor correction, and fault location and repairs. Now is the time for the job to be tackled to remedy the shortage of skilled maintenance electricians with benefit to our war effort, and at the same time emphasise the importance of this work to those in authority.

Wistaston, Ches., *February 24th.* HAROLD GREAVES.

### Electric Clocks and Time Signals

May I suggest to generating station authorities that the time on the mains be corrected at certain definite and recognised times each day. It is very difficult to put an electric clock right for the following reason :—

If the clock is wrong, I do not know whether it is due to the station or other cause, or to having stopped for some reason. If, without my knowing, it is wrong due to the station, and I put it right at, say, 9 p.m. by the B.B.C. time signal, it may be wrong again in a few hours' time because the station has since corrected the time. If I put it right again by a subsequent time signal, the station time may have altered again since it was corrected.

If the station time was corrected at two definite and recognised times each day, once in the morning and once in the evening, ten minutes before a B.B.C. time signal (say at 7 a.m. and 9 p.m.) people would know that if they put their clocks right by either of these two time signals they would also be right by the station time. The time could still be corrected as at present, provided it was also done at the recognised times.

Pinner, *February 21st.* D. V. ONSLOW, A.M.I.E.E.

### Mysterious Fires

In his article in your issue of February 21st, Mr. P. Ridler advocates the separation of gas pipes from both water and electrical systems as a means of preventing fires in domestic premises. This is the orthodox view, and is one solution. Another solution is to bond together the water mains, cable sheaths, gas pipes and steel framework of the building.

Clearly this involves the use of the gas pipes as part of the earthing system, and such a suggestion may seem heretical, but are we certain that the risks of so doing are greater than the risks Mr. Ridler describes, bearing in mind all the opportunities there are for fortuitous contact between the services, particularly when wiring or piping an old building ?

Harrow, *February 24th.* H. G. TAYLOR.

### The First Searchlight Battery

Having had the honour of commanding what I believe is the oldest searchlight battery in the country for some months now, I am endeavouring to find out something of its early history. As it was founded in Chelmsford by Col. R.E. B. Crompton, R.E., in 1896, and was thereafter closely associated with the electrical industry, I am writing to ask if any of your readers could help me.

The unit was first commanded by Lt.-Col. John Hopkinson, R.E. (V.) and was, I believe, then known as the E.E. R.E. V.R. Lt.-Col. W. A. Vignoles, D.S.O., was the first officer of the unit. At some later date the unit was turned into the Essex Field and Fortress Company, R.E. During the 1914-18 war it manned searchlights round Harwich, when 2nd Lieut. H. Church, M.C., R.E., played a great part in the development of the anti-aircraft searchlight.

Somewhere about 1935 the name was changed to No. 1 A.A. S/L Company R.E., but unfortunately it lost that identity in 1939 when it was turned into the 469th S/L Battery R.A.

The unit has been commanded by old Cromptonians on many occasions in the past and as an old Cromptonian myself I am honoured to have been posted to such a battery where I can carry on the old traditions. Any " tit-bits " will be welcomed.

*February 22nd.* B. G. DRUMMOND, Major, R.A., A.M.I.E.E.

# Battery Vehicles

## *Can the Handicaps be Surmounted?*

***The Institute of Fuel discussion on Mr. J. Steele's paper brought out many points for and against the electric vehicle and disclosed the difficulties under which it labours at present***

OPENING the meeting of the Institute of Fuel in London on February 27th, at which Mr. J. Steele (E.D.A.) presented a paper on battery propelled vans (which we summarised last week), Mr. W. M. Selvey, who occupied the chair pointed out that hitherto such vehicles had only been "made" rather than manufactured in this country, but what the author had to say was closely bound up with that smokeless age which everybody interested in fuel was most anxious to see come about.

In the subsequent discussion Mr. J. D. Troup remarked that, although he was an entire novice in this subject, it was well to be reminded just where coal fitted in to the electric vehicle scheme. The running costs of tyres were given at a higher figure for the electric vehicle than for the petrol vehicle, but he should have thought it would have been the other way about owing to the more even torque of the electric motor. Maintenance and depreciation appeared to be the major costs, but the author had not given comparative costs for electric and petrol vehicles. There was a possible market for local taxis, since a large number of petrol vehicles was being used for quite short journeys in all weathers, and the electric vehicle would avoid the possibility of the freezing of the circulating water and there would be the saving in petrol consumption.

Mr. E. Brown (Hackney Electricity Department) said that for a 20-cwt. vehicle the annual cost had been variously given as £12 and £20, and even £40. What was one to make of such figures? This complexity had held back, to some extent, the development of battery vehicles. Could the mercury arc rectifier be adapted to the charging of batteries of varying capacities and number of cells, say 44, 42, 36 and 30 cells? He had been told by the rectifier manufacturers that this was an almost insoluble problem, a fact which surprised him greatly. For the automatic control of charging it was most usual to rely on the ampere-hour meter fitted to the vehicle, although he believed there was a tendency now for some arrangement to be fitted externally to the vehicle which, when a certain voltage was reached (2·35 V per cell) brought a time device into operation, a measured quantity of electricity being fed into the battery thereafter.

### Comparative Fuel Consumption

Dr. G. E. Foxwell, remarking upon national fuel policy, wanted to know just where the electric vehicle stood in that connection. If a certain amount of coal were converted into electricity which, in turn, were converted into miles in an electric vehicle, exactly how much coal would be required for a given mileage, over-all? That would give a basis upon which electricity so used could be co-related with the gas producer and other forms of vehicle propulsion.

Mr. W. M. Selvey recalled that the author had frankly said that the electric battery vehicle was expensive, but he had not said how expensive, or which part of it was expensive. It had been shown that the chassis was simple, that the motor was very much simpler than the petrol engine, and that any kind of body could be used, so that it must be the battery. Had anything been done to standardise the different makes of battery so that a vehicle could drive into a depot and change its battery for an equivalent one of a different make? The changing and stocking of batteries ready for use would involve a considerable amount of capital invested in many stations.

Mr. E. Brown, referring to the "electric horse," suggested there might be a battery also in the other half of such vehicles, *i.e.*, the trailer or truck half, which could be re-charged while the vehicle was standing during unloading or loading. Mr. C. W. Kneighton said that enormous weight had to be pulled about for a relatively small power. The result was that such vehicles were largely limited to level roads. In the early days he was closely associated with the people who were concerned with the Kreiger electric carriage and there were constant arguments which never got them anywhere. It really amounted to watt-efficiency, not ampere-efficiency.

Mr. T. C. Elliott (D. P. Battery Co., Ltd.), after congratulating the author, suggested that a weekly running mileage of 300 (as set out in the table of costs) should be reduced to 200, as the average distance covered by such vehicles was between 30 and 40 miles per day and not 50 miles. The life of a petrol vehicle was about seven years while that of a battery vehicle was about fifteen years or more. Again, the life of tyres would be considerably less on the petrol vehicle than on the electric vehicle. The history of the electric battery vehicle had been one long hard struggle and the reason might be that there was too much petrol in this country before the war. Most of the Continental countries had been forced by economic circumstances to use other fuels than petrol. He was hoping that with the increasing shortage of petrol there would be Government support for the electric vehicle for short haulage.

### Types of Battery

Mr. J. Steele, replying to the discussion, said the difficulty with the alkaline battery was the rather high internal resistance. The "Drumm" accumulator introduced silver, which was not terribly expensive, and presumably had a longer life, but he did not think it had any advantages over the nickel-iron-cadmium accumulator. Actually he believed that many users of electric battery vehicles would experience lower costs than those published, but as soon as one started pulling somebody else's costs statement to pieces and making all sorts of special provisions, then the whole value of a table was destroyed.

The extra cost of a spare battery would be from 25 to 30 per cent. of the cost of the vehicle. In the case of the petrol vehicle depreciation and maintenance were always taken as a running cost. In the case of the electric vehicle the mileage was small so depreciation and maintenance became more of the nature of a standing charge.

The efficiency of the lead-acid battery was of the order of 80 per cent., and that of the alkaline battery of 72 per cent. The loss of voltage was rather more important than the loss of current.

Costs must of necessity be complicated because some were proportional to nothing at all and others were partially proportional to the mileage run. It was doubtful if one could sell a ten-year-old petrol vehicle at any price, although it might be as good as it was on the day it was bought; depreciation was a stumbling block and represented quite a large proportion of the total cost.

The amount of coal used per mile was about ¾-lb. based on 1.5-lb. of coal per kWh generated. For a 15-cwt. vehicle the figure was 0.42 kWh per mile; for a 30-cwt. vehicle it was 0.6 kWh; for 8-10 cwt. vehicles about 0.3 kWh; for a 20-cwt. vehicle 0.5 kWh; and for a 25-cwt. vehicle about 0.55 kWh, the vehicles in all cases being about half loaded.

The small amount of steel being released by the Government at the moment, both for petrol and electric vehicles, was totally insufficient for the country's needs. The chassis for an electric battery vehicle was essentially a hand-made job to-day. The demand was not sufficient to warrant any really mass production efforts and it was from the vehicle makers that standardisation must really come. An output of about 5,000 vehicles per year, which was probably ten times more than any factory was turning out to-day, would enable prices to be reduced.

The handling and charging of batteries ready for use would have to be carried out by the battery manufacturers co-operatively. The problem appeared to be financial rather than technical.

---

## Ventilation in the Black-out

A PAPER by Mr. E. W. Murray on "Ventilation (Natural and Artificial) in Relation to the Black-out" is to be read on March 11th, at a joint meeting of the Chemical Engineering Group (Society of Chemical Industry) and the Institution of Chemical Engineers at Burlington House, Piccadilly, W.1.

# PERSONAL and SOCIAL

## *News of Men and Women of the Industry*

AT a recent meeting of the Sutton Coldfield Town Council it was decided again to extend the service of **Mr. T. Bloore,** the borough electrical engineer, for another twelve months.

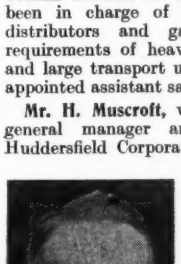
**Mr. W. Dundas,** whose appointment as city electrical engineer and manager at Bradford we recently reported, received his technical training at Birkenhead School of Science, where he obtained the premier award for examination results in engineering, Bradford Technical College, the Northampton Institute, London, and Manchester School of Commerce, and served his apprenticeship with the Liverpool Overhead Electric Railway Co. from 1897 to 1902. In the latter year he was appointed shift engineer (subsequently becoming mains engineer) to the Shipley Urban District Council, but after a brief stay at Shipley, joined Callender's Cable & Construction Co., Ltd., as a draughtsman. In 1905 he became engineer-in-charge with the Metropolitan Railway Co., with whom he later became electrical plant maintenance engineer. Mr. Dundas joined the Manchester Corporation Electricity Department in 1911 as shift charge engineer at Stuart Street power station, three years later becoming resident engineer at Dickinson & Bloom Street stations. He held this position for twelve years when he was appointed resident engineer at Barton power station. He entered the service of Bradford City Electricity Department as deputy city electrical engineer in 1929, and has held this position until his recent appointment as city electrical engineer.

Mr. W. Dundas

**Mr. C. R. D. Tuckey,** the well-known Davis Cup player, has been appointed head of the Planning Department of British Timken, Ltd. He joined the company in 1937 and until 1940 was representative, specialising in automotive and aircraft products. Mr. Tuckey holds a Cambridge honours degree in Mechanical Sciences.

**Mr. H. K. B. Glassey,** who has been with British Timken for twenty years, and has been in charge of replacement sales to distributors and garages handling the requirements of heavy commercial vehicle and large transport undertakings, has been appointed assistant sales manager.

**Mr. H. Muscroft,** whose appointment as general manager and engineer of the Huddersfield Corporation Transport undertaking was reported in our last issue, is forty-two years of age. A native of Thornhill, near Dewsbury, he received his early training with the Bradford Corporation Transport Department, where he was successively technical assistant and chief engineering assistant. From Bradford, he went to South Shields as general manager and engineer of the Corporation Transport Department, and after two years there took up a similar position at Southend-on-Sea. As we have already stated he will have to give three months' notice at Southend. Mr. Muscroft enlisted at the age of sixteen and served through the last war. His commencing salary at Huddersfield will be £900 per annum.



Mr. H. Muscroft

**Mr. G. H. Adams** was appointed to the position of chief engineer of the St. James' and Mayfair District of Central London Electricity, Ltd., on January 1st. He received his technical education at Faraday House and works training with the Aster Engineering Co., of Wembley, Bruce Peebles & Co., of Edinburgh and the Belfast Corporation Electricity Department. He subsequently joined the staff of the County of London Electric Supply Co. as assistant engineer at the Wandsworth generating station, and later transferred as mains engineer to the London Electric Supply Corporation, Ltd. In 1937 he joined the staff of the Central London Electricity, Ltd., and was attached to the Engineer-in-Chief's Department, later being transferred to the St. James' and Mayfair District as deputy to the chief engineer.

**Mr. R. W. Gregory,** M.I.E.E., has been nominated for the chairmanship of the North-Eastern Centre of the Institution of Electrical Engineers for the 1941-42 session.

**Dr. Irving Langmuir,** associate director of the General Electric Research Laboratory at Schenectady, N.Y., has been elected president of the American Association for the Advancement of Science. The *Electrical World,* from which the accompanying portrait of Dr. Langmuir is reproduced, says that he will take office at the 1941 meeting of the Association at Dallas, Texas. Dr. Langmuir has received many honours including the Nobel Prize for chemistry. He is well known for his work on thin films, gasfilled lamps, vacuum tubes and hydrogen welding.

Dr. Irving Langmuir

**Mr. H. Brockelsby,** serving with the Fleet Air Arm, and formerly a charge engineer with the Exeter Corporation Electricity Department, was married on February 8th, to Miss Marian Watson at Siddal (Yorks.) Methodist Church.

**Mr. G. G. Jobbins** has been reappointed chairman of the State Electricity Commission of Victoria for a further period of five years.

**Mr. J. M. Roper,** of the Woolwich Borough Electricity Department, is shortly to take up an appointment as assistant engineer with the Central Electricity Board.

We regret to hear that **Sergeant Horace Teeton,** R.A.F. Volunteer Reserve, has been posted as missing. Sergt. Teeton who was called up at the outbreak of war, formerly assisted his father in the business of H. W. Teeton, Ltd., electrical engineers and suppliers, of Hanley, Stoke-on-Trent.

## Obituary

**Mr. G. L. Coventon.**—The death has occurred at Gloucester at the age of sixty of Mr. George L. Coventon, who was well-known in electricity supply works in Gloucestershire. Mr. Coventon was first employed by the India Rubber, Gutta Percha & Telegraph Works Co., Ltd. Later he became resident engineer to the Chepstow Electric Light & Power Co., Ltd. On the transfer of that company to the West Gloucestershire Power Co., Ltd., he joined the latter company (in 1929) as publicity and development engineer, leaving last year owing to ill-health. He set up in business on his own, however, in Cheltenham. Mr. Coventon was hon. secretary of the Western Centre of the Institution of Electrical Engineers, and was an associate member of the Institution.

**Mr. H. A. Pryor.**—We regret to record the death on February 25th of Mr. Harry A. Pryor, manager of the Manchester branch of Siemens Electric Lamps & Supplies, Ltd. Mr. Pryor joined the company in November, 1908, and for many years was advertising manager. In May, 1923, he was appointed manager of the company's Manchester branch.

**Mr. James Lawrence,** representative of Edison Swan Cables, Ltd., for the Manchester and Liverpool area, died on February 15th after a short illness. He had been with the company since its inception.

**Mrs. R. K. Morcom.**—We extend our sympathy to Col. R. K. Morcom, C.B.E., chairman of Belliss & Morcom, Ltd., in the loss of his wife, Mrs. Frances Isobel Morcom, who died on February 26th. Mrs. Morcom, who was in her sixty-fourth year, was the daughter of the late Sir Joseph Swan.

**Mr. H. R. King.**—The death is announced on February 21st of Mr. Harry Rupert King, B.Sc., who was lecturer in electrical engineering at Blackburn Technical College. Starting at the College as a laboratory boy he held teaching appointments at Coventry, Doncaster, and Wigan Technical Colleges from 1912 to 1920, and returned to the Blackburn College as a member of the engineering staff.

**Mr. Kenneth Mark Taylor,** of Hilderstone House, Stone, Staffs., whose death has occurred at Penmaenmawr, where he had been spending the winter for health reasons, was formerly a director of Taylor Tunnicliff & Co., Ltd.

**Mr. P. L. Dwyer.**—The death occurred at his home in Brighton on February 23rd, of Mr. Philip Dwyer, who was proprietor for twenty-seven years of P. L. Dwyer & Co., electrical wholesalers, originally at 66, Victoria Street, S.W.1, later at 30, Grosvenor Place, London, S.W.1.

**Mr. A. Shaw,** whose recent death is announced from Bournemouth at the age of seventy-four years, was for a considerable period borough electrical engineer of Ilford. He retired nine years ago, after nearly thirty years' service.

## I.E.E. Scholarships

APPLICATIONS, which must be received not later than April 15th, are invited for the following scholarships awarded by the Council of the Institution of Electrical Engineers. Inquiries for full particulars and nomination forms (specifically mentioning the name of the scholarship) should be addressed to the Secretary of the Institution, Savoy Place, London, W.C.2.—The Duddell Scholarship (value £150 per annum, tenable for three years); the Swan Memorial Scholarship (value £120, for one year); the Silvanus Thompson Scholarship (value £100 per annum and tuition fees tenable for two years); and the William Beedie Esson Scholarship (value £120 per annum, tenable for two years, renewable in approved cases for a third year).

# Accumulator Storage

## *Keeping Batteries in Condition for Long Periods*

**By A. F. Davis**

TEMPORARY evacuation of premises through enemy action or other causes may render it necessary to put a storage battery out of commission for an indefinite period. No hard and fast rule can be laid down regarding the course to be followed as this depends to some extent on the type of battery and its condition at the time and whether the supply of electric power for recharging is more or less indefinitely cut off. With car and radio accumulators the financial loss would not be great if they were replaced by new ones when again required, but even these types can be kept in good condition for fairly long periods provided the necessary care and attention is given to them.

Periods of four or five months must be regarded as the maximum during which car and radio batteries may be out of commission, even if fully charged when put out of service. A small trickle charge may be given during this period to maintain the state of charge, but if the battery is comparatively new it could be dried off by fully charging it, withdrawing the plates and removing the separators from the container. The negative plates should be soaked in pure clean water for forty-eight hours, after which the plates of both polarity should be stored in a dry state until the battery is again required.

If it is wished to put the battery out of service for a longer period than four or five months it should either be dried off or given periodical recharges. The separators should be treated as indicated later.

*The author describes methods of dealing with accumulator plates which, he claims, will enable them to be restored to satisfactory service after long inactivity*

Large stationary batteries representing a fairly heavy capital outlay must be dealt with quite differently. Where recharging facilities are available and the batteries are readily accessible, almost any type can be left assembled and given a periodical livening charge to compensate for internal and external electrical losses. A partial discharge and full recharge is also recommended when this can be given. If the battery can be left undisturbed and given periodical recharges, this is much to be preferred. It is where charging facilities are not likely to be restored for some time that immediate attention to the battery is imperative, and as it is then impossible to charge the battery fully the procedure described as Method No. 2 below should be followed. Either Method No. 1 or 2 would, however, be quite satisfactory for stationary batteries. I have a leaning to Method No. 1 as being perhaps the less troublesome and as having the advantage that the battery is more quickly brought into good condition when re-installed, but in that case a supply of current must be available for fully charging the battery.

**Method No. 1** :—Fully charge the battery until peak values of specific gravity and voltage have been reached. Remove connections between cells and dismantle. The negative plates should immediately be placed in pure clean water to prevent oxidisation and soaked for forty-eight hours, after which they should be allowed to drain and dry off. Also special treatment of the positive plates is necessary, whether of the Planté (pure lead) or Faure (pasted) types, and these may similarly be allowed to drain and dry off after removing wood separators for appropriate treatment.

On withdrawal of the plates it may be found that the electrolyte occupies no more than one-quarter of the internal capacity of the container so that the electrolyte from other cells can be stored in some of the containers, and the remaining containers used for soaking off the negative plates. Two negative groups can usually be soaked in one box by nesting the plates together. This method has the advantage that electrolyte of the same specific gravity can be used when re-installing the battery without the adjustment normally given at the end of the freshening charge.

**Method No. 2**:—Fully charge the battery until peak values of specific gravity and voltage have been reached and then discharge the battery to as low an e.m.f. per cell as possible, possibly to 0.3 to 0.5 V and a specific gravity of 1.050 or even less. The battery should then be short-circuited by a heavy copper bar across the terminals. Soaking the negative plates in water is unnecessary, as discharged negative plates will not heat or oxidise when taken out of the electrolyte. This is the only course to follow if a supply of electric power is not available.

A certain amount of lead sulphate which is insoluble is liable to be left in the plates and there would be much difficulty in removing this at a later date. There would also be a considerable amount of specific-gravity adjustment required at the end of the freshening charge following re-installation.

If there are any buckled positive plates they should be straightened when the battery is fully charged as they are then in a softer condition and rather less liable to fracture. Wood boards of correct thickness should be placed between the plates and the whole group gently but firmly pressed or clamped together until the plates are again straight. Care must be taken not to use sudden force or undue pressure, as otherwise the plates may fracture.

If the negative plates have any "furry" growth upon the surfaces or top edges, this should be removed by means of an ebonite or wood scaling stick—preferably the former. Any excess formation of peroxide scale on the surfaces of the positive plates should also be removed. Glass spray arrestors and tube separators should be removed, washed thoroughly, dried and packed in a safe place. Wood separators shrink and split if dried and are best placed in a cell container with dilute acid of 1.050 s.g. until again required. It may be necessary to place a weight (lead, glass or porcelain preferred) on top of the separators to keep them well immersed. Care should be taken in handling them during dismantling as otherwise they may be damaged.

In a large battery the cost of fresh acid is a not inconsiderable item, but unless the old electrolyte is found to contain impurities which would be harmful to the future working of the battery, there is no need to dispose of it. It can be allowed to remain in the cell containers provided it is covered up to prevent the entry of dust or other extraneous matter. As sulphuric-acid electrolyte does not deteriorate with age and does not evaporate, there is no need to change it at any time during the life of a battery unless it is known to have been contaminated in some way.

When the battery has been re-assembled for further service, it should be given a long charge at the normal current rate specified by the manufacturers until all plates gas evenly and well and peak values of voltage and specific gravity have been attained. Any adjustment of specific gravity which may be necessary should then be made.

---

## Potato Chip Production

OPERATION data relating to the preparation of potato chips is given in *Electrical West*. The equipment consists of a steel vat, 30 by 60 in. by 18 in. deep, insulated on sides and bottom with 3 in. of rockwool and heated by nine 5-kW immersion units thermostatically controlled to maintain temperature between 325 and 375 deg. The hourly output is 60 lb. of chips from 200 lb. of potatoes for a consumption of 63.2 kWh. This compares with 6 gal. of fuel oil required by the two 30-in. round steel kettles previously used.

The consumer states that while the cost of electricity is almost twice that of fuel oil, there is nevertheless a saving of 28c. for each 100 lb. of potatoes fried. Advantages of the electric method are an increase of about 16 per cent. of chips from the same quantity of potatoes and better flavour of the product, both due apparently to closer temperature control resulting in evaporation of the desired minimum of moisture and in the correct absorption of cooking oil, and improved keeping qualities of the product. As the cooking oil does not burn, there is a saving of at least 1 lb. per 100 lb. of potatoes, and as the sediment is well below the elements the chips are free from carbon deposit.

# Farm Wiring

## *Sound Installations at Minimum Cost*

By T. C. Gilbert, A.M.I.E.E.

DURING a recent discussion of the E. R. A. Report Ref. W/T2, "Application of Electricity to Agriculture and Horticulture," it was stated that there are two reasons why most of the farms in this country are not taking a supply, namely (1) the cost of giving a service, (2) the cost of wiring the farm.

There seems to be no good reason why the cost of wiring the farm should be high. Cleat wiring has been, and is, a very suitable form of electrical distribution over the average farm, and with recent official approval given to this older system, some revival may be expected in its applications. It is in its essentials an insulated wiring system, and thereby not dependent upon the present restriction of metals; the absence of metal enclosure, either for the wiring or the accessories, makes its installation simple and inexpensive.

*Mr. Gilbert scouts the idea that farm installations must necessarily be expensive and shows how sound work can be done at reasonable cost by employing cleat wiring*

At the same time, a great deal more skill is required than might appear from a cursory examination of a cleat wiring installation, chiefly in the direction of good lay-out. An inexperienced man can make a hopeless mess of cleat wiring if he works from hand to mouth, as it were, and a cleat installation with cables crossing all over the place, and with too many cables exposed to mechanical damage, cannot be safe.

In a simple and efficient cleat wiring installation ordinary v.i.r. cable mounted upon the usual two- or three-groove porcelain cleats is quite suitable. In general, the two-groove cleat requires one screw fixing and the three-groove two screw fixing, so a great deal of work can be eliminated by concentrating upon the two-groove pattern. The number of cleats required can be considerably reduced if single-strand wires are used, instead of multi-strand, as sagging is not so pronounced, and with a slight strain imparted to the wires, the cleats may be spaced up to 3 ft. apart, depending upon the quality of the fixing to be obtained.

Concentration on two-groove cleats means that looping is not possible. Runs on the average farm are inclined to be long, so that looping is uneconomical in any case. With cleat wiring, the usual objections associated with joints do not apply, and very simple runs can be laid out with every divergence from the sub-circuit run made by simple soldered joints between the cleats, which, with their rubber insulation, need not be more than ½ in. long. There is no need to surround these joints with boxes; in fact, the fewer such enclosures the better, as so many small insects and animals use them for nesting and other purposes.

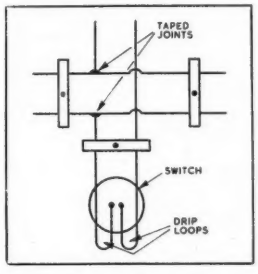



**Fig. 1.—Drip loops prevent penetration of moisture into accessories**

The first essential, therefore, is to find a good run for the sub-circuit wiring through the building, the various circuits from this run being secondary to this. It will generally be more convenient to take this run through the ground floor of the average farm building, as the greatest demand is usually there. The wiring should be run about one foot from the ceiling, on a continuous wall if possible, as the regulations, and common sense, demand that the wiring should be in view throughout its length. Lighting or other points can then be attached by means of joints to this run, the joints being made between the cleats and in full view; if they are out of reach they could almost be left uninsulated, but in any case they will not demand much skill in the making or insulating. The orthodox rubber-and-tape joints are preferable to mechanical connectors as they are damp-proof.

If a run is to be taken to the floor above, a short length of steel conduit, bushed, should be passed down through the floor to about 6 in. above the wiring run; the end of the tube is thus also in sight. If t.r.s. wires are taken from the sub-circuit to the switch above, then the tube need not be earthed. In any case, if the tube is remote from other earthed metal, no great risk will be incurred if earthing is conveniently forgotten with v.i.r. wiring, but the necessity can also be evaded by enclosing the steel conduit in wood strips where it is touchable above the floor above. In the lower floor, the steel tube will be more than 8 ft. above the floor, and not subject to earthing requirements.

In runs between buildings, the v.i.r. can be continued out through a porcelain tube and carried on a length of steel wire. In my view the use of hangers is unsightly, as they have a tendency to move to the lower end of the run, leaving loops at other points. If the ends of the steel wire can be strongly attached to the wooden portions of the buildings, the v.i.r. can be taped to it, but if good fixing of the steel wire demands that it be attached to metal work, then this method is doubtful unless the ordinary cheap radio aerial insulators be inserted in each end of the steel wire. In all cases the steel wire should be stretched taut, as any undue movement will lead to difficulty with the v.i.r.

Drip loops outside the porcelain tubes should not be overlooked, or water running down the wires will be carried into the building.

In damp situations the presence of water on, or running down, the wires has little or no effect upon them, but it is a very different story if this water penetrates into the interior of accessories such as switches or sockets. This can be avoided if simple drip loops are made just above such accessory entries (fig. 1) and just before the v.i.r. cables are led into lighting fittings. In buildings housing pigs a great deal of condensation in the roof seems to take place, and moisture will run down wires and flexes unless steps are taken to minimise the trouble, even in otherwise dry buildings.

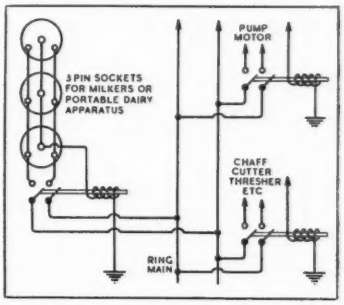



**Fig. 2.—Long earth wires are avoided by the use of leakage trips**

Mechanical protection of the v.i.r. cables is usually easy, but metal enclosures should be avoided, not only because of the earthing necessity, but also because when subjected to blows from animals they may themselves damage the wiring. Wood slats screwed on either side of the run will usually provide all the protection necessary, but accessories should invariably be mounted above the height of the average farm animal, say 6 ft. from the floor. All accessories should, of course, be of the insulated variety, and if mechanical protection is considered necessary, placed within a wooden frame or box.

It is good practice to avoid the use of wood blocks as far as possible, as these become filled with insects with webs, and deterioration of the wiring follows. They can be filled with plastic compound, but this is a further installation expense, although sometimes necessary in damp situations. The mounting of a switch on two short distance-pieces accommodating the fixing screws is more suitable, in my opinion, and this also permits the wires being brought down below the switch and turned upwards into the terminals in dampish places, providing in this way the suggested drip loop. There is a lack of accessories suitable for farm work with cleat wiring, and the best possible must be done with standard types; a switch with front entry for the circuit wires, preferably at the bottom, and secured by means of a front cover, would be very welcome.

Considerable saving in wiring and electricity consumption can

be effected and problems of damp eliminated in many cases with the generous use of ceiling switches fitted with long operating cords. I noted recently in a house devoted to the lying-in of pigs that the provision of ceiling switches over the various pens enabled local lighting to be controlled as the attendant moved from pen to pen. Wherever even slight damp is suspected, the use of brass screws is essential for fixing the cleats.

### Earthing Arrangements

The installation can be kept entirely non-metallic for lighting, but not for power applications. Some of the most amazing messes of cleat wiring result from attempts to carry an earth circuit round with the wiring, and this may range from a thin copper tape held in position by the cleat screw to another conductor carried in a groove in the cleat. Apart from the cost of the earth conductor itself, the use, possibly, of three-groove cleats in place of two-groove, or two two-groove in place of three-groove, entails expenditure on double the number of screws and fixings. With a cable earth conductor, it is not uncommon to find circuits tapped to the phase and the earth instead of to the neutral, as it is difficult to identify the earth wire ; a bare wire is not held securely by the cleats.

For small power applications, such as portable tools and milkers, the use of three-pin sockets is essential, but only the two circuit wires should be run to the points by means of the cleat wiring system. If there are several such sockets in one building, a bare wire can be taken from earth terminal to earth terminal and, eventually, through an earth-leakage switch to a simple earth-spike driven near by. The leakage switch is arranged to cut off the supply to the sockets in the event of earth fault, so that it should be placed in the feed line to the sockets. This represents considerable saving in expense over the carrying of a continuous earth wire back to some remote earthed point which, even then, could not be easily tested to ascertain any breakage or defect. On the other hand, with a leakage switch arranged in the same building as the sockets, this long run is avoided, and a constant test is conveniently available (fig. 2).

With three-phase motors, it is only necessary to run the three-phase wires on three-groove cleats. A controlling switch must be fitted near the motor and, if this takes the form of a triple-pole leakage switch, the earthing of the motor can be carried out locally through this switch to a spike driven at some convenient point near by. The increase in cost of the leakage switch over the orthodox ironclad switch would only be a matter of shillings, but the whole cost of the more usual earth circuit is avoided. In this way the main objection to cleat wiring for power circuits —that it is difficult and even expensive to run an adequate earth circuit over long distances—can be eliminated.

The alleged necessity to provide this earth circuit has led in many cases to the installation of metal-clad wiring systems on farms, either steel-conduit or lead-sheathed, for which they are entirely unsuitable. It is now generally agreed that the effective earthing of such systems on farms is quite problematical, and the extending of leakage voltages all over a farm by means of this continuous earth circuit is a thing to be avoided. The use of the earth-leakage circuit-breaker eliminates this risk, enables considerable reduction in wiring costs to be made, and, what is probably more important, provides an effective protective system under constant check for safety. It also permits the complete installation of lighting and power wiring over the average farm without any concern for continuous earth circuits, and in the cheapest form of wiring known, v.i.r. cables on porcelain cleats.

### Robust Fittings Needed

The present need is for more robust switches and sockets that will stand up to farm conditions better than the standard types, which were designed for the better-treated domestic installation. In order to avoid excessive cost, these could take the form of standard accessories, mounted in boxes of insulating material of similar pattern to ironclad boxes. As the usual ironclad switch is merely a standard flush-type switch placed in a box with an exterior operating handle, this adaptation could be made with an insulating box for farm use, with attention to cable entries and the exclusion of damp and pests.

With all its advantages of cost and technical excellence, cleat wiring should really be worth a special set of accessories for farm work, which might have the effect of still further reducing costs, as the present necessity for providing mechanical and other protection in certain situations would thereby be avoided.

---

# The London J.E.A.

## *Committees' Reports*

AMONG the matters which were to be considered at yesterday's meeting of the London & Home Counties Joint Electricity Authority was a statement of the Finance Committee that a preliminary report upon the financial results of the operation of the Authority's distribution undertaking during 1940 showed a net surplus of £15,072. This surplus reduces the accumulated net deficit to £69,025. The accounts will be available shortly.

### The Kingsbury Order

The General Purposes Committee reported that the Electricity Commissioners had made the Kingsbury Electricity (Extension of Purchase Date) Order, 1941, under which the period of thirty-five years after which the Wembley Corporation may purchase from the Northmet Power Co. the undertaking authorised by the Kingsbury Electric Lighting Order, 1905, is extended by three years. The Committee stated that it had informed the Commissioners that it had received no notice of the application and the Commissioners had replied that public notice was required to be published in a local newspaper. Arrangements had now been made for particulars of any applications of this nature affecting undertakings in the Authority's district to be furnished to the Authority.

### The Kingston Fire

In the action taken in the High Court by the Kingston Corporation against the Central Electricity Board and the General Electric Co., Ltd., for damages suffered by the Corporation by the fire at its generating station in 1938 and against the Authority for indemnification, the Authority has delivered a defence denying liability, the other two defendants having already delivered their respective defences. The Authority, with its defence, has served upon the General Electric Co. a third party notice claiming full indemnity against the company. The Authority had previously served a writ upon the Central Electricity Board claiming similar relief. In these circumstances, the Committee stated, it has not been necessary for the Authority to take third party action against the Board in the proceedings instituted by the Kingston Corporation.

### Kent Electric Power Bill

The principal points of the Kent Electric Power Bill had been considered by the Committee, together with a letter received from the Conference of Local Authorities Owning Electricity Undertakings in Greater London forwarding a copy of certain objections in principle to the Bill which had been sent to the Electricity Commissioners. A number of local authorities in the Authority's district were petitioning against the Bill. The Committee proposed to consider the Bill further at its next meeting.

### Mains Assistants

The Local Distribution Committee reported that it was not possible to fill from the existing staff three vacancies caused by the leaving of three mains assistants and applications had been invited by advertisement. The Committee stated that it had been informed that considerable difficulty now existed in obtaining suitably qualified mains assistants and it had decided to bring the matter to the attention of representative electricity supply associations.

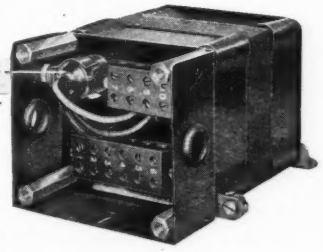
The Authority gave instructions on January 3rd, 1940, that no permanent appointment or promotion should, unless otherwise directed by the Authority, be made to fill any vacancy which might occur in the permanent service during the war period. But having regard to the position reported the Committee recommended that its action should be approved and the persons concerned should be appointed to the permanent staff of the Authority.

# Fluorescent Lighting

## *Technical Details of the 80-W, 5-ft. Tubular Lamp*

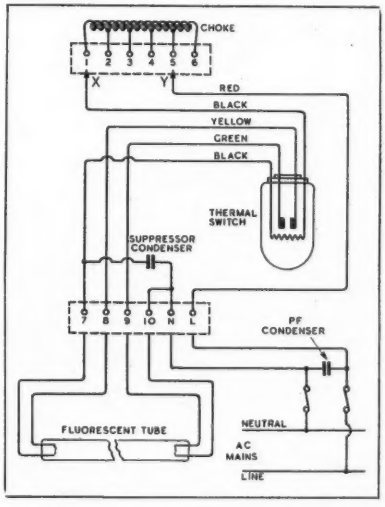
A SOURCE of glare-free illumination which has an initial efficiency some two-and-a-half times that of a gasfilled filament lamp yet radiates only about one-quarter of the heat and gives light of a colour approximating to daylight is now available, it is claimed, in the 80-W, 5-ft. tubular fluorescent lamp that has recently been put on to the market. The technical details presented below have been supplied to us by the Lighting Section of the Edison Swan Electric Co., Ltd., which holds the view that no more spectacular advance has been made in the technique of light production since Swan's invention of the original carbon lamp.

The 5-ft. tube has, at each end, an electrode in the form of a coiled filament which is coated with, or contains, a small pellet of, electron-emitting material. When the lamp is alight a discharge in mercury vapour takes place between these electrodes, resulting in a faint bluish-green light characteristic of a mercury discharge, together with a large amount of ultra-violet radiation. The latter is invisible but activates special fluorescent powders coated on the inside surface of the tube, thus producing white light in sufficient quantity to swamp the light of the discharge itself.




**End view of auxiliary choke**

It is the powder which, in effect, becomes the main source of light and, being slightly phosphorescent, it radiates some light continuously, even though the discharge arc is extinguished every time the AC cycle passes through zero. The stroboscopic effect of these lamps is, on this account considerably less than is the case with electric discharge lamps of other types.




**Circuit diagram of fluorescent lamp**

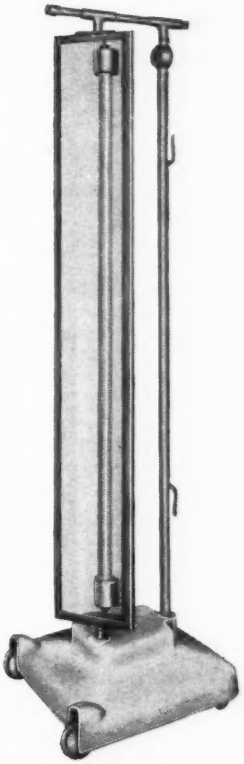
The lamp strikes up almost immediately the switch is closed, but for about three minutes the light output is approximately 20 per cent. below normal, after which it rises to about 10 per cent. above normal. During the next quarter of an hour it will fall gradually to a stable value of 2,800 lumens for a new lamp. No readings of ft.-candle values should, therefore, be taken for at least twenty minutes after switching on. The lamp operates most efficiently when the ambient temperature is about 45 deg. F., but normal variations in temperature do not seriously affect the light output.

The lamp will burn satisfactorily in any position, and is comparatively insensitive to minor voltage variation. A 2 per cent. decrease in volts causes only about 2 per cent. loss of light, whereas with a filament lamp the loss would be about 8 per cent. As these lamps are designed for specific voltages between 190 and 260 at 50 cycles they must be connected through the auxiliary apparatus in strict accordance with the manufacturers' instructions. For lower-voltage supplies, step-up transformers may be used.

### Control Gear

A choke with tappings to suit various supply voltages must be included in each lamp circuit, its casing usually containing a thermally-operated automatic starting switch and small radio-interference suppressor condenser. Since the choke introduces reactance, a condenser is necessary to improve the power factor and 0.85 or 0.9 is usually obtained by connecting an 8 $\mu$F. condenser across the incoming cables. A single condenser of a value recommended by the lamp manufacturers may be installed for correcting the power factor of a group of lamps.

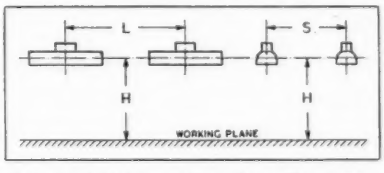
When the lamp is first switched on, the contacts of the starting switch are touching and current flows *via* the choke, through both lamp electrodes, which it heats, and through the heater of the thermal switch. Almost instantaneously the contacts of the thermal switch open, breaking the inductive circuit and causing a voltage surge sufficient to promote the discharge between the electrodes. Current continues to pass through the heater of the switch, thus retaining the contacts in the open position until the lamp is switched off, when they automatically close ready for the next operation. The lamp will strike again immediately the circuit switch is closed.



**"Industria Portalux" unit for 5-ft. tube**

TABLE A.
ILLUMINATION FROM SINGLE TROUGH

| Distance from centre in ft. | Height Above Working Plane: 3 ft. 6 in. Longitudinal F | 3 ft. 6 in. Lateral G | 4 ft. 6 in. Longitudinal F | 4 ft. 6 in. Lateral G | 5 ft. 6 in. Longitudinal F | 5 ft. 6 in. Lateral G | 6 ft. 6 in. Longitudinal F | 6 ft. 6 in. Lateral G | 7 ft. 6 in. Longitudinal F | 7 ft. 6 in. Lateral G | 8 ft. 6 in. Longitudinal F | 8 ft. 6 in. Lateral G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | F | OOT-CANDLES | | | | | | | | |
| 0 | 43 | 43 | 28 | 28 | 20 | 20 | 14 | 14 | 11 | 11 | 9 | 9 |
| 1 | 38 | 35 | 26 | 24 | 19 | 17 | 13 | 13 | 11 | 10 | 9 | 8 |
| 2 | 29 | 23 | 21 | 18 | 16 | 14 | 12 | 12 | 10 | 9 | 8 | 7 |
| 4 | 10 | 7 | 10 | 7 | 9 | 7 | 7 | 7 | 7 | 6 | 5 | 4 |
| 6 | 3 | 1 | 4 | 2 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 |
| 8 | – | – | 0.3 | 0.7 | 1.5 | 2 | 1.5 | 2 | 1 | 2 | 2 | 2 |
| 11 | – | – | – | – | – | – | – | – | – | – | 0.5 | 0.5 |



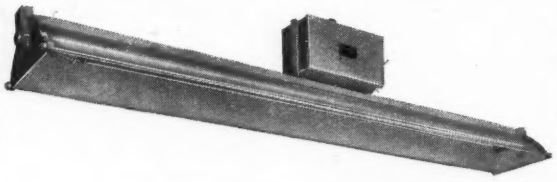

**Spacing-height ratio using dispersion type enamelled reflector**

Where H is greater than 4 ft. 6 in., L = 1½H and S = 1½H. Where H is 4 ft. 6 in. or less, L = 1½H and S = H

### Reflecting Equipment

In view of the shape of the lamp, a long trough reflector is most suitable, at least for industrial and commercial installations, where fittings

are for utility rather than decoration. An enamelled surface is used almost universally as the reflecting medium, partly because of its high reflecting properties and also because under present conditions other materials are not available for lighting purposes. Until very recently synthetic enamel only was being used in trough reflectors of this length, but as a result of extensive experiment it is now possible to use vitreous enamel, avoiding the old difficulty of the warping of the trough during the firing process. The permanency of this reflecting surface and ease with which it can be cleaned are found to be appreciable advantages.



**Trough for housing two or three tubes**

The light output, although large in relation to wattage, is nevertheless of a moderate order, and, therefore, large numbers of lamps and reflectors might appear to be necessary, so increasing

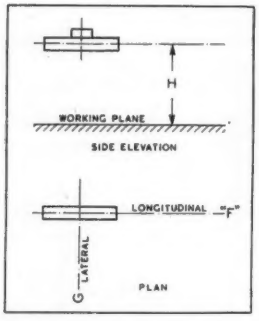
TABLE B.

ILLUMINATION FROM SINGLE ROW OF TROUGHS IN SINGLE LONGITUDINAL LINE FOR TYPICAL BENCH WIDTH OF 2 FT. 6 IN.

| Spacing between centres. L | Height of tube to working plane. H | Average ft.-candles over whole. |
|---|---|---|
| 6 ft. 0 in. | 4 ft. 0 in. | 35.0 |
| 6 ft. 9 in. | 4 ft. 6 in. | 29.0 |
| 7 ft. 6 in. | 5 ft. 0 in. | 24.5 |
| 8 ft. 3 in. | 5 ft. 6 in. | 20.0 |
| 9 ft. 0 in. | 6 ft. 0 in. | 17.0 |
| 9 ft. 9 in. | 6 ft. 6 in. | 14.5 |
| 10 ft. 6 in. | 7 ft. 0 in. | 12.0 |
| 11 ft. 3 in. | 7 ft. 6 in. | 10.0 |
| 12 ft. 0 in. | 8 ft. 0 in. | 8.25 |

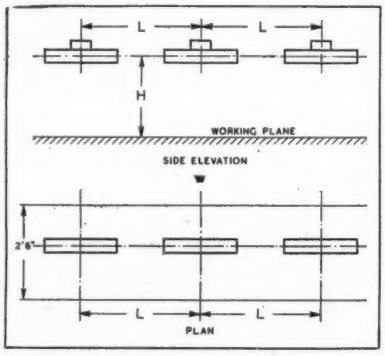
equipment and installation costs. This is avoided in the two and three lamp-trough fittings that have been designed and manufactured by the Edison Swan Co.

There is no technical reason why the control gear should be close to the lamp, but usually the housing for the auxiliary equipment is more conveniently made integral with the reflector. Manufacturers normally supply the equipment wired and with the choke tappings adjusted for the appropriate supply voltage, only the two connections to the mains having to be made on site.




**Illumination given from a single trough**

Where it is desired to place the choke remote from the lamp, *e.g.*, near a fuseboard, the same reflectors can be supplied with the thermal switch and suppressor condenser only, mounted thereon as a unit. This arrangement simplifies installation by allowing two circuit wires to be run to the fitting instead of the four that would be necessary were the complete auxiliary unit to be fixed in the remote position.




**Illumination obtained from a single row of troughs**

Trough reflectors and tubular fluorescent lamps can be used as portable or local lights as well as for lighting lines of assembly or inspection benches and for general overhead illumination. A completely portable unit on wheels has been developed which has a reflector that is adjustable through 270 deg. while the whole unit may be used in either horizontal or vertical position. The control gear is housed neatly in the base which forms a robust mounting. Such a fitting can conveniently provide supplementary light on vertical surfaces or illuminate the underside of horizontal surfaces such as aeroplane wings and lorry chassis. As the brightness of the lamp is only about 3 candles per sq. in., the source of light is non-glaring and need not be screened in order to comply with clause 3 (b) of the Factory Lighting Regulations which came into force on February 1st.

## Installation Notes

Whilst the accompanying tables are based on the lighting equipment illustrated, similar results may be obtained from reflectors of other contours, and equivalent efficiency of reflecting surface.

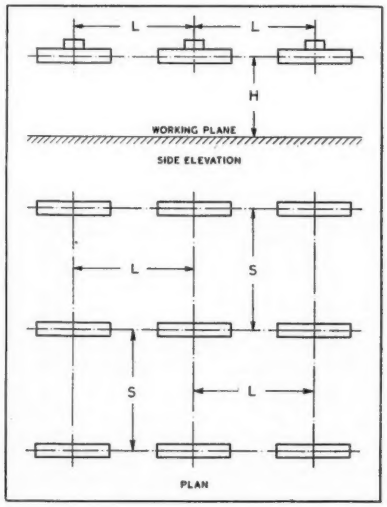
Using a dispersive type enamelled reflector at very low mounting heights the iso-ft.-candle diagram, owing to the shape of the lamps, will be elongated with the major axis lying directly along the lamp itself. With increasing mounting heights, however, the light distribution becomes more symmetrical in shape, and at 4 ft. 6 in. above the working plane it becomes approximately circular.

TABLE C.

ILLUMINATION FROM SYMMETRICALLY ARRANGED MEDIUM AND LARGE GENERAL LIGHTING INSTALLATIONS

| Watts per sq. ft. | Average ft.-candles. | Watts per sq. ft. | Average ft.-candles. |
|---|---|---|---|
| .25 | 3.4 | 2.00 | 27.2 |
| .50 | 6.8 | 2.50 | 34.0 |
| .75 | 10.2 | 3.00 | 40.8 |
| 1.00 | 13.6 | 3.50 | 47.6 |
| 1.25 | 17.0 | 4.00 | 54.4 |
| 1.50 | 20.4 | 4.50 | 61.2 |
| 1.75 | 23.8 | 5.00 | 68.0 |

At mounting heights greater than 4 ft. 6 in. above the working plane, therefore, the spacing-height ratio should be the same as for dispersive type reflectors designed for filament lamps; *i.e.*, the distance from centre to centre, measured both longitudinally and transversely, should not exceed 1½ times the height above the working plane. At mounting heights less that 4 ft. 6 in. the transverse spacing should be reduced to equal the mounting height in order to obtain reasonable uniformity of illumination over the whole area.




**Illumination obtained from symmetrically arranged medium and large general lighting installations**

Spacing L and S should be equal, except when mounting height is 4 ft. 6 in. or below, when S should be equal to H. Spacing L should always be 1½H. Recommended maximum for H is 8 ft. 6 in.

From Table A, giving the ft.-candles obtained at various distances from a new lamp in a reflector mounted at six different heights and its associated diagram, the resultant intensities from multi-lamp installations can be derived. Illumination values of two or three ft-candles obtained a few feet distant from the centre of a lamp may be of little interest where only a single lamp is used, but in large installations the light from adjacent lamps overlaps and the "build up" must be taken into account when assessing the resultant illumination over the area.

In Table B is shown the average illumination received on a typical work bench 2 ft. 6 in. wide from a single line of fittings overhead at various heights. The lower average illumination for benches of greater width may be derived from Table A.

For installations comprising a large number of fittings, the spacing and mounting height can be worked out with the aid of Table C. Thus, if 20 ft.-candles is required over an extensive area, the table shows that 20.4 ft-candles will be obtained with a lighting load of 1.5 W per sq. ft. One 80-W lamp must therefore serve an area of 80/1.5 = 53.3 sq. ft.; in other words, the spacing of the fittings must be the square root of 53.3, say, 7 ft. 3 in. apart. The mounting height is then 2/3 of 7 ft. 3 in. or 5 ft. above the working plane.

While it is not claimed that the 5-ft. fluorescent tube will solve every lighting problem or prove the most suitable light source for every industrial process, it can be stated that already thousands of these lamps have been successfully applied in almost every industry.

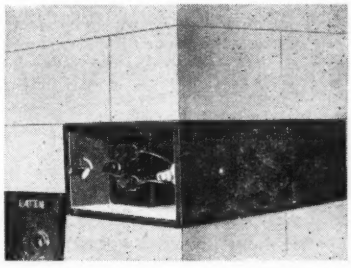
# RECENT INTRODUCTIONS

## *Notes on New Electrical and Allied Products*

### Dry Accumulator Lamps

THE strongly constructed battery lamps evolved for use in shelters or for A.R.P. and similar emergency purposes, by the LATEM ELECTRICAL CO. (proprietors: Bradford Metal Case Co., Ltd.) Eastwood Street, Hall Lane, Bradford, are so assembled as to prevent unauthorised access to the interior parts, circumventing pilfering. One model is provided with a 1.5 W bulb and convex reflector; the strong well-glass and lid fit on to rubber gaskets, are hinged and both are locked with set-screws. Built into the lid is a 5A Tucker switch, which may be key-operated or of the tumbler pattern. The accumulator is of the Varley "dry" type, constructed on the lead-acid principle, but not containing any jelly or free liquid electrolyte that will spill. The lamp can therefore be used in most positions and three reinforced fixing holes are provided in the back of the heavy iron casing for screwing it to a wall or ceiling. It is enamelled inside and out, the overall dimensions being 7.75 in. in height by 5 in. in width and 6 in. in depth.

A variant, with overall dimensions of 3⅜ in. in height by 6¾ in. in width, by 9¼ in. in depth, is a similarly substantial casting suitable for building into brick, or stone, or concrete structures, to serve as a luminous indicator of the position of a shelter by means of two cast letters "S" with amber



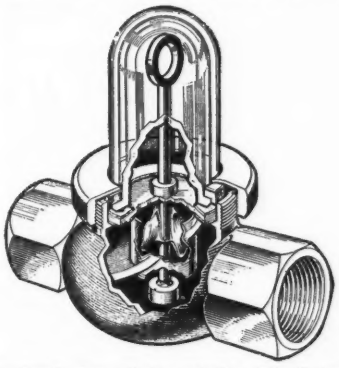
"Latem" luminous indicator for shelters

colour filters and wire guards. A tapped conduit entry at the back permits the fitting to be connected to the mains, or it may be made self-contained with a "dry" accumulator.

### Arkon Flow Indicator

An improved type of visible flow indicator known as the "Arkon" is announced by its makers, WALKER, CROSWELLER & CO., LTD., Whaddon Works, Cheltenham, Glos. This indicator is primarily intended for use in pressure lubricating and water-cooling pipe lines, but its application is of value wherever a flow of oil or water is to be maintained, particularly in closed circuits.

The indicator is simple in construction and operation. A heavy bronze body contains a cast propeller on a stainless steel spindle; on the other end of the spindle is mounted the "flag," a red and black disc, enclosed in a dome of specially toughened glass (tested



Sectional view of the rotating "flag" type liquid-flow indicator

hydraulically to over 500 lb.). Oil or water as it passes spins the disc and so gives visible indication that the flow is not interrupted, as would be the case if the disc became stationary. It is made in standard sizes of ½, ¾, 1, 1¼, 1½, and 2 in. Larger sizes can be made to order and the glass dome can be fitted with a protective cage.

### Glass Fabric Insulation

IMPERVIA, LTD., 3 Grosvenor Gardens, S.W.1, has succeeded in perfecting a process for combining glass fabrics impregnated with special "Impervex" rubber compounds into a strong and durable material which is to be known as "Rubbaglex." This material can be made, in any desired thickness, in the form of strip, tape, sleeves, cord, rope, tubing, hose, cable and moulding, etc., and it can be woven in an ordinary cotton weaving machine. It is extremely light in weight and much stronger than canvas.

Besides being proof against the action of water, petrol, oils, acids, alkalis, alcohols, salt water, steam and all weather conditions, "Impervex" is claimed to withstand a temperature of up to 800 deg. C. Its exceptional strength, durability and incorrodibility, coupled with its high dielectric value, renders it especially suitable for use as an electrical insulator for cables and the like. Sound insulation is another application.

### New Industrial Lighting Fittings

Twenty-six members of the Electric Light Fittings Association (Industrial and Commercial Section) have, by special arrangement, agreed to produce a standardisep range of pendant type industrial lighting reflectors of two classes.

The first range comprises dispersive reflectors, with 1⅛ in. hole fixing, produced in accordance with B.S.S.232, in the following sizes:—10 in. diameter 40 W; 12 in. diameter 60 W; and 14 in. diameter 100 and 150 W. The second class consists of two sizes of open neck shades (1⅛ in. hole fixing) with 20 deg. angle of cut-off if suitably mounted, ensuring compliance with the new Factory Lighting Regulations. The sizes are 9 in. diameter 60 W and 11 in. diameter 100 W.

### Handy Spray Painter

A recent addition to the range of transportable air compressors produced by B. E. N. PATENTS, LTD., High Wycombe, Bucks., is a one-gun machine with a reserve of power sufficient to create a suitable pressure for spraying heavy materials and to avoid high speed, which can sometimes be troublesome. This P 3 model is driven by a 0.5-HP AC repulsion-induction or DC motor, there is no extra charge for single-phase. The vee-belt drive reduces the motor speed from 1,400 to 700 RPM, at which the vertical single-acting compressor displaces 2.5 cu. ft. of air per minute.

Its normal working pressure is 60 lb. per

Relatively low speed motor - compressor for spraying purposes

sq. in. and a stream of air is directed over a coiled copper after-cooler by the vaned compressor flywheel, thus ensuring the delivery of cool air into the expansion chamber. Filters, a moisture separator and drain cock, relief valve and pressure gauge are fitted, while in addition to paint spraying this machine can be used with an automatic chuck for inflating vehicle tyres or for operating a spring oiler or blow gun.

# COMMERCIAL and INDUSTRIAL

## *Dearer Lighting Fittings. Conditions in Eire*

### Purchase Tax on Lamps

WE recently reported the decision of the Central Price Regulation Committee to permit retailers to "round off" prices to which the addition of Purchase Tax had introduced odd farthings. The Electric Lamp Manufacturers' Association now informs us that following upon this decision it has secured approval to schedules of prices, including tax, for lamps produced by its members in Groups I and VIII (Type B) to operate from March 1st. This arrangement will be found on the average to be slightly to the retailers' advantage. The tax as charged to retailers remains unchanged, and is worked out on the basis of 26 per cent. of the total list value of the invoice (except for Kye Lamps, where it is 22 per cent.). This figure is strictly net, *i.e.*, subject to no deductions except that any fraction of a penny is ignored in the final calculation. Retailers should continue using this same method when selling to trade users entitled to discount.

### Lighting Fittings Price Increases

Owing to a further increase in the price of illuminating glassware and in production costs due to war conditions, the Electric Light Fittings Association has authorised its members to apply, as from March 1st, the following advances upon the prices ruling at the outbreak of war :—Ornamental and decorative type fittings 33⅓ per cent.; commercial fittings 33⅓ per cent.; certain lines of industrial fittings 20 per cent.; and watertight, bulkhead and flameproof fittings and handlamps 25 per cent.

### Insurance of Commodities

The Board of Trade has, with the approval of the Treasury, decided that for the period beginning March 3rd and ending June 2nd, the rate of premium payable under the Commodity Insurance Scheme shall continue to be at the rate of 7s. 6d. per cent. per month.

### Industrial Registration

In order to secure an adequate supply of skilled men for work in shipyards, the Minister of Labour has made an order requiring men of twenty years of age or over, who within the last fifteen years have been engaged for not less than twelve months in certain scheduled occupations, to register at employment exchanges from March 17th to 19th. The trades covered include ships' blacksmiths, boilermakers and fitters, electricians, fitters and welders. It is emphasised that registered men will not necessarily be taken from their present occupations; any move will be dependent upon the nature and importance of the work upon which they are now engaged.

### Overseas Trade Figures

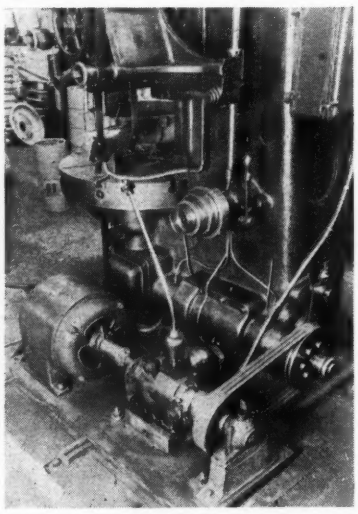
The Board of Trade has decided to suspend the publication of the brief summary of overseas trade which has been issued monthly since the beginning of the war. It is said that, even in this abbreviated form, the figures are capable of conveying useful information to the enemy.

### Imports from the Belgian Congo

The Board of Trade announces that, following the addition of the Belgian Congo and Ruanda-Urundi to the list of countries included in the Sterling Area, an open general licence has been issued permitting as from March 1st, the importation without further licence of among others, the following goods if consigned from the Belgian Congo or Ruanda-Urundi :—Antimony ores, concentrates and residues; antimony, crude and semi-manufactured; beeswax; crude cobalt; graphite; jute; mica; shellac; sillimanite; and tin.

### Converting Obsolete Machine Tools

Three obsolete vertical boring machines were recently required for work of national importance. They were driven from counter shafts through a two-speed gearbox, and owing to vibration the work produced was very poor. It was decided therefore to modernise them, and a new drive was designed. Two-speed Brook motors were mounted direct on to bedplates, the drive being taken through a 20-HP synchromesh



**A modernised vertical boring machine**

gearbox from a motor car, parts of the original clutch being used. The original drive was discarded and replaced by vee belts. Control was from push-button stations and pole change contactor. The result exceeded expectations. Vibration was almost entirely eliminated and first-class finished work is being produced at higher speeds. The machines are now much more flexible, and with the four-speed gearbox eight different table speeds can be obtained. Another interesting point of this conversion was that all three machines were changed over in less than fourteen days.

### Irish Electrical Traders

The annual meeting of the Society of Irish Electrical Traders was held recently in Dublin, when Mr. J. F. Ryder, the president, in dealing with the Society's activities during the past year, said that the year just past had been one of the most critical for members, due to the effect of the war. Difficulties had been experienced in obtaining the materials which were necessary for maintaining the electrical industry in Ireland, a great percentage of which had to be imported. Restrictions on these imports would become even more severe in the future. The wholesale members of the Society had been doing great work in securing these stocks through every possible channel. On the contracting side, many of their members had been badly hit as a result of the slowing down in the building trade, increased cost of materials, and difficulties in obtaining them. Mr. Ryder expressed regret that the membership of the contractors' section did not show a more substantial increase. If they could have a meeting of the entire electrical trade and obtain their views on the necessity of having electrical work carried out by qualified contractors only, they could gain more strength and approach the Government with a view to having legislation introduced to protect the trade and the public and impose penalties on unqualified persons doing electrical work.

### E.D.A. Annual Luncheon

The annual luncheon of the British Electrical Development Association is to be held at the Savoy Hotel, London, W.C.2, on March 21st. The Earl of Lytton (the president) will be in the chair and the guest of honour and principal speaker will be the Minister of Transport, Lieut.-Col. J. T. C. Moore-Brabazon. Tickets can be obtained from the Director, 2, Savoy Hill, W.C.2.

### War Demands on Radio Industry

Since the beginning of the war large demands have been made by the Services on the wireless industry for many kinds of sets, valves and other components. Hitherto it has been possible to meet these demands without any material curtailment of supplies for the home market and for the export trade. It is inevitable, however, that with the rapid expansion of the Forces these demands will be in ever increasing quantities and that the radio and valve manufacturing industries will be called upon to play an increasing part in the war effort.

It follows that there can no longer be available, except in very limited numbers, components such as valves required for the maintenance of domestic radio sets or new sets to replace those which go out of operation. The radio set and valve industries have been asked to work to a long term programme which will mean a severe limitation on the release of such components as valves for the domestic markets.

In connection with export trade, special arrangements will be made to meet, so far as is possible, the demands for valves for maintenance purposes and in part, at any rate, the demand for new sets.

### Swiss Electrical Goods for Russia

According to *Reuter* (Moscow) a trade agreement between the Soviet Government and Switzerland has recently been signed. Under this Switzerland will export to Russia machine tools, electrical equipment, turbines, generators, electric motors, steam boilers, hydraulic presses and scientific instruments in exchange for grain, timber, petroleum products, cotton and other goods.

### Export-promoting Films

The Board of Trade Press Office is co-operating with the British Council in sponsoring the production and exhibition of documentary films dealing with industries engaged in export trade. Already films have been produced dealing with coal, shipbuilding, iron and steel, pottery, pedigree stock and textiles. The films are between 1,000 and 1,500 ft. in length and are made under expert supervision by the leading film producing companies. Exhibition abroad is arranged by the British Council through both commercial and other channels.

Under the arrangements now made the

Council is willing to bear about four-fifths of the cost of making a film for an export group, or the industry which it represents, if the group agrees to bear the remainder of the cost and if the subject matter is considered suitable for film treatment. The Council would supervise production and bear all the costs of distribution, and copies of films would be provided if groups wished to arrange showings of their own at exhibitions or meetings. The Press Officer of the Board of Trade will put any group interested in the scheme in touch with the British Council.

## American Official Sentenced

According to the *Electrical World*, Howard C. Hopson, the former head of the Associated Gas and Electric System, has been sentenced to five years' imprisonment for "mulcting $20,000,000 from the system," following his conviction in the United States District Court in New York.

## Flexible Cords for Miners' Cap Lamps

A new Standard Specification for flexible cord for miners' cap lamps, No. 937-1940, features flexibility coupled with resistance to damage by tension, ability to withstand bending without fracture of the conductor, exclusion of readily ignitable insulation or filling materials, resistance of the sheath to deterioration by absorption of oil or grease and maximum electrical conductance compatible with the requisite flexibility. Copies may be obtained from the British Standards Institution, 28 Victoria Street, London, S.W.1, price 2s., post free 2s. 3d.

## A Disclaimer

The Anglo-Hispano Trading Co., Ltd., 131, Baker Street, London, W.1, asks us to state that, in spite of some similarity in name, it has no connection whatever with the defendants in a recent prosecution under the Limitation of Supplies Orders which we reported in our issue of February 21st.

## New Salvage Campaign

New measures to ensure still greater salvage of essential materials were announced last Monday by Mr. Judd, Controller of Salvage, Ministry of Supply, when introducing the "new season's" salvage campaign. The twenty-eight honorary district advisers have been strengthened by the appointment of sixty-five honorary assistant advisers; conferences have been held with several hundred local authorities to pool ideas and plans for increasing efficiency; area transportation officers are to give help to councils experiencing special transport difficulties; and collection is being made compulsory in urban districts with populations of between five thousand and ten thousand.

As an indication of the success of last year's campaign, Mr. Judd stated that 800,000 tons of waste materials valued at £2,200,000 had been salvaged, including enough metal to make 16,000 tanks, and enough paper to fill forty ships.

## An Inquiry from Madras

A firm of merchants in Madras, asks us to put it in touch with exporters or original manufacturers of electric lamps; bakelite and polished brass accessories; conduit; high-voltage fittings; and motors of from ¼- to 10-HP, AC and DC. Will interested readers communicate with us?

## Multi-lingual Publicity

Increasing export business is reported by Morphy-Richards, Ltd., who tell us that they are now actively represented in every country in the world now open to British manufacturers. Part of their success is due, no doubt, to their effective publicity. We have received from them a well-produced folder dealing with their automatic electric irons with signal lamps and with it are four smaller reproductions in French, Spanish, Portuguese and Dutch, all bearing the equivalent of the title upon the English version—"The Magic of the Tell-tale Light."

## Switch and Fuse Gear Publication

To assist electrical contractors undertaking installation work on behalf of Government Departments the Midland Electric Manufacturing Co., Ltd., Reddings Lane, Tyseley, Birmingham, 11, has issued to the trade what it claims to be the first comprehensive price list (256/1/41) illustrating a range of "M.E.M." switch and fuse gear specially designed to meet War Office requirements and complying with D.F.W. Specification No. 12. The first section of the booklet covers ironclad switch-fuses from 15 to 200 A capacity, splitters, teak-cased and ironclad fuseboards, and the "Memroy" all-insulated switch-fuse. All this gear is acceptable for installations of a permanent character. A further section includes switch-fuses, splitters, and fuseboards which will be accepted for temporary installations in militia huts, etc., for example. Certain of the lines in common demand are being kept in stock.

## American Electrical Exports

The United States Department of Commerce reports that the total value of electrical exports during the first eleven months of last year was $128,051,584, an increase of about 27 per cent. as compared with the corresponding period of 1939. The principal increases occurred in the items motors, 1/3 HP and under, and interior lighting fittings and parts.

## Catalogues and Lists

**General Electric Co., Ltd.** Magnet House, Kingsway, London, W.C.2.—Illustrated and priced brochure (X9213) technically descriptive of the construction and performance of high rupturing capacity cartridge fuses and accessories.

**British Thomson-Houston Co., Ltd.,** Crown House, Aldwych, London, W.C.2.—Business Guide: Lighting Series No. 1, indicating the main principles governing the design of good factory lighting installations, with details of the wide range of "Mazdalux" fittings from which the most suitable for any particular factory can be chosen.

**Electric Art Shades (1928), Ltd.,** Feering Factory, Kelvedon, Essex.—The company's spring list of bedlights (No. 117).

**G. Turnock, Ltd.,** 41, High Street, Aston, Birmingham.—A revised wholesale and export price list of "Tunion" bakelite accessories.

## Changes of Address

A. C. Wells & Co., Ltd., are now at Providence Mill, Alexandra Street, Hyde, Ches. (Telephone, Hyde 771/2/3).

Samuel Jones & Co., Ltd., have moved to 16-17, New Bridge Street, London, E.C.4. The telephone and telegraphic address remain unchanged.

## Trade Announcement

Woodhall & Partners (1929), Ltd., have opened a stores near Sketty bus terminus, Swansea.

# Earth-fault Protection

SO-CALLED artificial electrodes for protective earthing in country districts assumed to be served by overhead lines, without water mains or cable sheaths being available as fault-current paths, were discussed in a paper prepared by Dr. H. G. Taylor (Copper Development Association) for submission to the Association of Supervising Electrical Engineers in London on March 3rd.

The paper incorporated a substantial section of the second E.R.A. report (ref.: F/T 122) concerned with the safety of consumers in rural areas, the author remarking that engineers had first to decide how much safety they could afford to pay for before they could discover how their requirements could be satisfied most cheaply. Ideas had been changing as well as practice, so the author set about exposing some of the common fallacies about electrodes before proceeding at some length, with the aid of diagrams descriptively to compare two protective methods that differed in principle.

He dealt first with multiple (neutral) earthing, enumerating certain safeguarding measures likely to minimise the risk of open-circuiting due to neutral breakage, stating that various alternatives were being tried out in the belief that a safe design should be practically possible without undue expense. Next followed a commentary on the voltage tripping of (earth leakage) discriminative circuit-breakers in accordance with B.S.S.842, indicating the dependence of various factors on one another and the influence of earthing electrode resistance, with examples of circumstances that might adversely affect discrimination, or render ineffective the continuity of the protective circuit.

Turning to the employment of leakage breakers in parallel with ordinary earthing, a method about which there had been considerable difference of opinion, examination of the relative merits of each half of the combination led the author to the conclusion that this method was questionable in the case of ordinary small domestic installations, when the resistance of the direct earth was likely to be too high to permit the "blowing" of the sub-circuit fuse concerned.

When uttering the usual warning about the re-wiring of fuses correctly the author remarked that there seemed to be little hope of the general introduction of the cartridge type.

The operation of each of the protective systems discussed depended upon the soundness and continuity of the earthing circuit. For ordinary and protective multiple earthing it must be of low resistance and capable of carrying the fault current without developing hot spots; for leakage breakers the tendency might be to provide a lightly insulated thin wire that might not adequately withstand mechanical damage and corrosion. Conduit-joint continuity troubles could be avoided by the use of light-gauge copper conduit with capillary soldered joints, or mineral-insulated cable sheathed with copper for factory wiring when heavy fault-currents were to be expected.

# ELECTRICITY SUPPLY

## *Progress at Morecambe. Tynemouth Hire Terms Revised.*

**Birkenhead.**—ELECTRICITY CHARGES CONCESSION.—The Electricity Committee has recommended to the Corporation that a reduction in electricity charges be made to consumers whose windows have been boarded up as a result of enemy action, necessitating the use of artificial light during the daytime. It is proposed that where consumption is considerably in excess of the previous quarter the consumer may apply to the Electricity Department for a rebate, and if the application is approved the excess will be charged at the rate of 1d. per kWh instead of the flat rate of 3¾d. In the case of prepayment meters the excess consumption will also be charged at 1d. per kWh. These charges will apply to the Birkenhead town area, and also to part of the Bebington area, but in those districts where the charges are subject to a surcharge of 10 per cent. the reduced charge of 1d. per kWh will be plus the 10 per cent.

**Blackburn.**—X-RAY PLANT.—X-ray apparatus and a lift are to be installed in the Queen's Park Hospital, at a cost of £900.

**Brierfield.**—LOANS.—The Urban District Council is to apply for sanction to borrow £1,000 for a substation and equipment; £500 for the transfer of the existing station; and £3,000 for the hire of electric water heaters.

**Chester.**—RIPPLE CONTROL.—The Corporation Emergency Committee recommends the purchase of 150 relay sets at a cost of £675 and apparatus for two additional frequencies at £200 for the fire service.

**Clydebank.**—STREET LIGHTING AT NORTH KILBOWIE.—The Strathclyde Electricity Supply Co., Ltd., has informed the Town Council that the street lighting installation at North Kilbowie is held up and is not likely to be completed until the cessation of hostilities. Furthermore, owing to the increase in the cost of labour and materials, it cannot undertake to complete the work at the prices quoted and that it proposed to cease work on the job and charge the costs incurred at that date.

**Coventry.**—NEW MAINS AND PLANT.—The Corporation Electricity Committee is seeking sanction to borrow £33,696 for mains and plant.

**Darlington.**—SWITCHGEAR.—Sanction is being sought by the Town Council to a loan of £22,575 for a switchhouse and switchgear.

**Durham County.**—SHELTER INSTALLATIONS.—Approval has been received by the County Council to a scheme for the installation of heating and lighting in shelters at Durham, Chester-le-Street, Houghton-le-Spring, Stockton, Easington, Sedgefield, Lanchester, and Bishop Auckland Institutions, at a cost of over £800.

**East Grinstead.**—INCREASED CHARGES.—At a recent meeting of the U.D.C. consideration was given to a report on the electricity undertaking for the year ended March 31st, 1940. The Electricity Committee recommended an increase of 10 per cent. in the electricity charges to apply from the June quarter this year. Dr. S. L. Walker (chairman of the Committee) stated that last year the undertaking lost about £1,200. The proposed increases would still allow the charges to compare favourably with those of other electricity undertakings. The Council adopted the increases proposed.

**Fareham.**—LIGHTING OF PUBLIC SHELTERS.—Approval has been obtained by the Urban District Council for the lighting of public shelters at a cost of £699.

**Grimsby.**—SUPPLY TO WALTHAM.—The Corporation Electricity Committee is to provide a supply of electricity to Waltham at a cost of £700.

**Liverpool.**—RATE RELIEF.—The Corporation Electric Power and Lighting Committee has voted £25,000 (against £30,000 last year) in aid of next year's rates. This is equivalent to a penny rate. Estimated net surplus is £40,000 on current year's operations; £15,000 will be transferred to reserve.

**London.**—ST. PANCRAS.—As a precaution for safeguarding the Council's distributing system the Borough Council Emergency Committee has approved arrangements for alternative means of supply by a transfer of three existing feeders, the cost of the alterations necessary being £750. Arrangements have also been made for an alternative supply to the premises of Carreras, Ltd., and the Committee has agreed to provide a standby low-voltage supply of electricity for the L.M.S. Railway to St. Pancras Station. A switch is to be replaced at a hospital substation at a cost of £202.

WANDSWORTH.—The Borough Council has approved proposals submitted by the County of London Electric Supply Co., Ltd., for the laying of underground electric cables in Nightingale Lane, Balham, and Wingford Road, Clapham South, etc.

**Morecambe and Heysham.**—A YEAR OF PROGRESS.—A statement on the operation of the Corporation electricity undertaking issued by the borough electrical engineer, Mr. P. Clegg, for the year ended March 31st last, indicates that the annual revenue has increased from £99,584 to £118,795 and the net profit from £13,705 to £14,899. The total load connected has advanced from 43,049 to 46,954 kW and the maximum demand from 5,510 to 7,400 kW. Sales of energy totalling 18,398,196 kWh, as against 16,368,854 kWh, showed improvement in all sections except street lighting and illuminations, the largest increase being for the combined domestic tariff, the sales under which rose from 8,683,749 to 10,556,989 kWh.

NEW TRANSFORMERS.—The Corporation Electricity Committee is to increase the pressure on e.h.v. feeders between the town and Lancaster by the provision of transformers, &c., at a cost of £9,300.

SUBSTATION PLANT.—The Corporation Electricity Committee is to increase plant capacity of substations at a cost of £1,600.

**Portland.**—SAFEGUARDING THE SUPPLY.—The U.D.C. Electricity Committee has prepared a scheme for additional links in order to provide security for the supply.

**Rotherham.**—HEATING OF SCHOOL SHELTERS.—The Town Council proposes to have school shelters heated by electricity.

CABLE EXTENSIONS.—The Council is to lay a cable from a substation at a cost of £800.

**Stoke-on-Trent.**—WIRING OF HOUSES.—In connection with a proposal for wiring 115 houses on the Meir estate, it was reported at a meeting of the Corporation Housing Committee that £650 had been spent on mains, &c., and in these circumstances it was decided to urge that the scheme should be proceeded with or that the Electricity Committee should be paid an agreed rate of interest on the capital expended.

MAINS EXTENSIONS.—The Corporation Electricity Committee is to extend mains to provide supplies to the Scouts' Hall, Chatsworth Place, Meir (at a cost of £65) and to Mr. J. E. H. Foster at Botteslow Mill, Leek Road, Hanley (£80).

INCINERATING PLANT.—Tenders are to be obtained by the Corporation Cemeteries Committee for the provision of gas and electrical incinerating chambers at Carmountside crematorium.

**Totnes.**—PROTEST AGAINST INCREASED CHARGES.—The Town Council is protesting to the Torquay Town Council against the recent increase of 12½ per cent. in the price of electricity and against the putting into operation of the increased charges a fortnight before they were advertised in the Press.

**Tynemouth.**—REVISED HIRE TERMS.—At a recent meeting of the Corporation Electricity Committee the electrical engineer reported that many consumers had removed for the duration of the war and in this connection it was decided in regard to their electric cookers and water heaters on hire that the period of notice required to determine agreements should be reduced from six to three months until the end of hostilities. It was also decided that the hire rental of new apparatus should be increased in proportion to the purchase price of such apparatus and that consumers wishing to hire apparatus purchased by the Corporation during the war should be required to enter into an agreement for three years instead of the present six months.

**Walsall.**—SUPPLY TO FACTORY.—The Town Council has decided to give a supply of electricity to a factory at an estimated cost of £5,150 (of which £3,800 will be reimbursed by the consumer concerned).

SAFEGUARDING THE SUPPLY.—To provide additional security to the supply of electricity in certain important areas should damage be caused by enemy action or otherwise two schemes submitted by the borough electrical engineer and manager estimated to cost £3,305 have been approved by the Committee.

## RADIO AND TELEPHONY

**India.**—NEW BROADCASTING STATION.—An order has been placed in England for a 100-kW transmitter for a new broadcasting station to be established at Delhi to serve Europe, Africa, and the Far and Middle East.—*Reuter* (New Delhi).

**Cardiff.**—WARNING SCHEME.—The Corporation Emergency Committee has considered alternative schemes, costing £27,984 and £23,000, prepared by the city electrical engineer for giving warning signals and has decided to approach the senior regional officer on the matter.

**France.**—NEW BROADCASTING STATION.—A new broadcasting station at Calais is being used by the Germans for their broadcasts in English.

**Portsmouth.**—RAID WARNING BY RADIO.—The Council of Portsmouth Chamber of Commerce is to bear the cost of a three months' trial of a proposed air raid alarm service within the "alert," making use of the Hants relay system. The scheme will utilise existing feeder wires which are now available in 450 roads in the city, so that without much extension large numbers of factories and premises could be covered by the system.

# NEW PATENTS

## *Electrical Specifications Recently Published*

*The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specifications (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.*

### 1939

10995. "Apparatus for the electromagnetic recording of sounds." G. Liguori. April 7th, 1938. (533146.)

13456. "Electrical control devices for clutches and associated change-speed gears." E. A. Derungs. May 7th, 1938. (533075.)

16170. "Electrical switches of the gas blast type." S. Farrer, G. Pailin and Ferguson Pailin, Ltd. June 1st, 1939. (533008.)

16633. "Radio and like relaying or repeating systems." Marconi's Wireless Telegraph Co., Ltd. July 1st, 1938. (533147.)

19126. "Beam signalling sytems." Igranic Electric Co., Ltd., and C. E. Randall. June 30th, 1939. (533010.)

19213. "Electric torches." M. M. Houghton. July 1st, 1939. (Cognate application, 660/40.) (533011.)

19443. "Arrangements for operating electric discharge lamps." Siemens Electric Lamps and Supplies, Ltd., J. N. Aldington and J. E. Askew. July 4th, 1939. (Cognate application, 412/40.) (533016.)

19887. "Electrical connecting means for non-linear resistance material." Automatic Telephone & Electric Co., Ltd., and L. S. Thomas. July 7th, 1939. (533214.)

20966. "Electric discharge lamps comprising luminescent materials." General Electric Co., Ltd., N. L. Harris and J. H. Shaylor. July 19th, 1939. (532941.)

22082. "Electromagnets." F. Newton. July 29th, 1939. (533215.)

22228. "Manufacture of insulated copper wire." Schenectady Varnish Co., Inc. October 4th, 1938. (533154.)

22354. "Electric furnaces." H. Swift and W. Pickles. August 2nd, 1939. (533024.)

22392. "Electrical conductors." W. C. Robinson and R. W. E. Moore. August 2nd, 1939. (532947.)

22393. "Electrical conductors." W. C. Robinson and R. W. E. Moore. August 2nd, 1939. (532948.)

22501. "Timing apparatus for controlling resistance welding and other circuits." British Thomson-Houston Co., Ltd. August 5th, 1938. (533029.)

22509. "Electric battery lamps." J. Lucas, Ltd., and H. V. Simco. August 3rd, 1939. (532956.)

22521. "Electric insulators." T. B. Andre Rubber Co., Ltd. (H. Bough). August 3rd, 1939. (532957.)

22550. "Liquid break electric circuit breakers." British Thomson-Houston Co., Ltd., and H. E. Cox. August 3rd, 1939. (533158.)

22590. "Manufacture of alternating electric current dry rectifiers." Westinghouse Brake & Signal Co., Ltd. September 21st, 1938. (532961.)

22592. "Alternating current rectifiers of the dry surface contact type." Westinghouse Brake & Signal Co., Ltd., A. L. Williams and R. H. Cubitt. August 3rd, 1939. (532962.)

22599. "Train control apparatus." W. A. Agnew and London Passenger Transport Board. August 3rd, 1939. (533080.)

22619. "Domestic cooking apparatus." Simplex Electric Co., Ltd., and P. W. Davis. August 4th, 1939. (533223.)

22649. "Landing lamps for aircraft." Rotax, Ltd., A. Massey-Allen and R. H. Woodall. August 4th, 1939. (533034.)

22670. "Generation of electric waves." Standard Telephones & Cables, Ltd., R. M. Barnard and W. Kram. August 4th, 1939. (533035.)

22758. "Electrical terminal couplings." S. Smith & Sons (Motor Accessories), Ltd., and L. Hall. August 5th, 1939. (533081.)

22922. "Method for the mechanical recording of sound." Philips Lamps, Ltd. August 10th, 1938. (533037.)

22963. "Electric resistance manometric apparatus." Gas Light & Coke Co. and R. P. Donnelly. August 9th, 1939. (533038.)

23234. "Automatic control of the thickness of material issuing from rolling mills and the like." British Thomson-Houston Co., Ltd. August 11th, 1938. (533162.)

24116. "Electrical switchgear having thermal overload release devices." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. August 22nd, 1939. (533163.)

24117. "Contacts for electrical switchgear." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. August 22nd, 1939. (533164.)

24118. "Thermally operated release devices for electrical switchgear." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. August 22nd, 1939. (533165.)

24119. "Electrical switchgear having thermally released overload trips." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. August 22nd, 1939. (533166.)

24120. "Overload-released switch mechanism." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. August 22nd, 1939. (533167.)

24121. "Electrical switchgear suitable for pole changing in motors." J. A. Crabtree & Co., Ltd., and H. F. McLoughlin. August 22nd, 1939. (533168.)

24707. "Fluid pressure actuated electric switches." British Thomson-Houston Co., Ltd. August 27th, 1938. (533169.)

25073. "Tubular surface coolers." British Thomson-Houston Co., Ltd. September 1st, 1938. (532968.)

25647. "Means for communicating with submarines." Ericsson Telephones, Ltd., and C. W. Wilman. September 12th, 1939. (532969.)

25886. "Electric torches and the like." Ericsson Telephones, Ltd., R. Gray and B. Blunt. September 15th, 1939. (Cognate application, 30550/39.) (532972.)

26364. "Electric metering apparatus." Sangamo Weston, Ltd. April 17th, 1939. (532976.)

26808. "Control gear for pass-out elastic fluid turbines." English Electric Co., Ltd., and H. G. Yates. September 28th, 1939. (532982.)

26813. "Cathode-ray tube indicators." E. J. Alway. September 28th, 1939. (532984.)

26871. "Electric motor controllers." Igranic Electric Co., Ltd. November 21st, 1938. (532989.)

26898. "Electric current-measuring instruments." Akt.-Ges. Brown, Boveri & Cie. March 30th, 1939. (532991.)

26904. "Turbine glands." Westinghouse Electric International Co. October 1st, 1938. (532992.)

26931. "Ball bearings." British Thomson-Houston Co., Ltd. September 30th, 1938. (532995.)

26946. "Cathode-ray tubes and the like." Standard Telephones & Cables, Ltd. September 30th, 1938. (532996.)

26996. "Bucket wheels for elastic-fluid turbines." British Thomson-Houston Co., Ltd. October 1st, 1938. (533000.)

27010. "Testing device for coils of electromagnets." English Electric Co., Ltd., L. Roberts and R. D. Ball. October 2nd, 1939. (533001.)

27030. "Electron discharge tubes." Marconi's Wireless Telegraph Co., Ltd. September 30th, 1938. (533046.)

27099. "Electric control valves with vapour or gas filling." Akt.-Ges. Brown, Boveri & Cie. October 3rd, 1938. (533087.)

27324. "Resinous compositions." British Thomson-Houston Co., Ltd. October 7th, 1938. (533095.)

27365. "Oil immersed circuit breakers." Switchgear & Cowans, Ltd., and A. Upton. October 6th, 1939. (533100.)

27448. "Electrodes for liquid resistances and the like." General Electric Co., Ltd., J. S. Cliff and C. J. O. Garrard. October 7th, 1939. (533103.)

27488. "Methods of exhausting and sealing envelopes having a metal portion to which the seal is applied." British Thomson-Houston Co., Ltd. October 7th, 1938. (533106.)

27489. "Methods of exhausting and sealing evacuated envelopes having a metal portion in which the seal is effected." British Thomson-Houston Co., Ltd. October 7th, 1938. (533107.)

27576. "Telephone and like signalling systems." Siemens Bros. & Co., Ltd., D. L. Clay, C. J. C. Bartlett and P. A. Chittenden. October 10th, 1939. (533113.)

27612. "Caps for electric discharge lamps." British Thomson-Houston Co., Ltd., and W. J. Scott. October 10th, 1939. (533118.)

27614. "Fastening devices, and methods of making the same." British Thomson-Houston Co., Ltd. October 11th, 1938. (533119.)

27708. "Magnetic shunts or sheet assemblies." Westinghouse Electric International Co. October 12th, 1938. (533131.)

27757. "Holders or sockets for electrical apparatus." British Thomson-Houston Co., Ltd., G. S. C. Lucas, R. Maxted and J. Bertram. October 12th, 1939. (533132.)

27785. "Circuit arrangements for influencing the modulation depth of an amplitude modulated oscillation." Philips Lamps, Ltd. October 15th, 1938. (533138.)

27845. "Wave filter." Standard Telephones & Cables, Ltd. November 5th, 1938. (533171.)

27863. "Electric indication apparatus." W. R. Sykes Interlocking Signal Co., Ltd., and J. H. Henderson. October 13th, 1939. (533173.)

27869. "Adaptor devices for electric lamp fittings." G. A. Mower. October 13th, 1939. (533176.)

27933. "Radio beacons." Marconi's Wireless Telegraph Co., Ltd., and S. B. Smith. October 14th, 1939. (533185.)

27945. "Electromagnetic switches of the type used in telephone systems." General Electric Co., Ltd., and W. R. Rose. October 16th, 1939. (533186.)

27952. "Wringing machines and the like." British Thomson-Houston Co., Ltd., and G. A. Williams. October 16th, 1939. (533188.)

27959. "Electric battery lamp for illuminating keyholes and other door and like fittings." R. H. Whiteley. August 3rd, 1939. (533189.)

28019. "Electric converting systems." British Thomson-Houston Co., Ltd. October 18th, 1938. (533192.)

28020. "Manufacture of electric heating resistances." British Thomson-Houston Co., Ltd. October 19th, 1938. (533193.)

28070. "Manufacture of wire provided with lacquer insulation." Philips Lamps, Ltd. October 20th, 1938. (533195.)

(*Continued on page* 448)

# FINANCIAL SECTION

## *Company News. Liquidations and Bankruptcies. Stock Exchange Activities*

## Reports and Dividends

**The Bristol Tramways & Carriage Co., Ltd.**—Presiding at the annual meeting on February 27th, Mr. J. F. Heaton (chairman), in the course of his speech, said that they owned a large number of properties in and around the city of Bristol. There had been some damage by enemy action, but this was not of a relatively serious nature. When they met a year ago, 75 per cent. or thereabouts of the tramway services had been abandoned, and it was hoped to deal with the remainder during the last financial year, but owing to various reasons arising out of the war this was found to be impracticable. The remaining services were, however, now being finally abandoned, and omnibuses only would in future be operated throughout the city.

**The Northmet Power Co.** recommends, subject to the completion of the audit of the accounts, the payment of the dividends on the preference stocks and a final dividend on the ordinary stock of 4 per cent. actual (9·6d. per £1 unit of stock), less tax at 8s. 6d., making 7 per cent. for 1940, as compared with 10 per cent. for the previous year when £100,000 was transferred from the contingency account to the net revenue account. £417,276 is to be placed to the depreciation and reserve account (against £415,446), and £56,381 is to be carried forward, as compared with £75,094 brought in.

**The Midland Counties Electric Supply Co.,** is paying a final dividend on the ordinary stock of 5½ per cent., making 8 per cent. for 1940 (same) The trading profits of the operating companies for the year were £832,170, as compared with £805,488 for the previous year, of which £468,966 is appropriated for depreciation and reserves in the operating companies. The net revenue, after tax, of the parent company is £343,061 (against £375.804).

**The City of London Electric Lighting Co., Ltd.,** has declared a final dividend of 3 per cent. (against 4 per cent.), plus 1 per cent. (against nil) from stockholders' reserve, making a total distribution of 7 per cent. for 1940 (against 7½ per cent.). The net profit for the year was £77,079 (against £103,759 for 1939).

**The Lancashire Electric Light & Power Co.,** is paying a final dividend of 5 per cent., maintaining the distribution for the year at 7½ per cent. The profit for 1940 was £617,143, as compared with £602,504 in the preceding year.

**The Bournemouth & Poole Electricity Supply Co., Ltd.** has announced a final dividend of 7½ per cent., making 12½ per cent. for 1940 (against 15 per cent.). The net profit was £66,469, as compared with £84,034 for 1939.

**The Richmond (Surrey) Electric Light & Power Co., Ltd.** is paying a final dividend of 4 per cent. (against 3 per cent.), making 6 per cent. (unchanged).

**The Newcastle & District Electric Lighting Co., Ltd.,** has declared a dividend at the rate of 7 per cent. on its ordinary shares for 1940.

**Bruce Peebles & Co., Ltd.,** are paying a dividend for the year on the 7½ per cent. preference at 7½ per cent., plus a participating dividend of 2½ per cent., making 10 per cent. (same), and 5 per cent. on the ordinary stock, plus a bonus of 3 per cent., making 8 per cent. (unchanged), all less tax.

**Waygood-Otis, Ltd.,** are paying a final ordinary dividend of 17½ per cent. (against 12½ per cent., plus a bonus of 17½ per cent.), making 27½ per cent. for the year (against 42½ per cent.).

**Ensign Lamps, Ltd.,** are maintaining their interim ordinary dividend at 10 per cent.

**The Direct Spanish Telegraph Co.** has announced a first and final dividend of 5 per cent. (same).

**Radio Rentals, Ltd.,** are paying a final ordinary dividend of 6 per cent., making 10 per cent. for the year ended August 31st (against 7½ per cent. for the previous year). Net profits, after providing for taxation, amounted to £25,360 (against £17,105).

**The Mersey Power Co.** has again declared a dividend of 8 per cent. in respect of 1940.

**The Mid-Cheshire Electricity Supply Co.** is maintaining its ordinary dividend at 8 per cent. for 1940.

**The Llanelly & District Electric Supply Co.** reports a net profit of £84,200 for 1940 (against £79,314). The ordinary dividend is again 5½ per cent.

**The Mersey Railway Co.'s** net revenue rose from £100,938 in 1939 to £104,462 in 1940. The dividend on the consolidated ordinary stock is raised from 1⅝ to 1¾ per cent.

## New Companies Registered

**R. Thackeray & Co., Ltd.**—Private company. Registered February 13th. Capital £200. Objects: to carry on the business of manufacturers and repairers of and dealers in dynamos, batteries, conductors, transformers, stoves, cookers, and general electrical supplies, etc. Directors: F. Asker, 76, St. Audreys Avenue, Bexley Heath, and three others. Registered office: Graham Road, Bexley Heath, Kent.

**Martin & McNair, Ltd.**—Private Company. Registered in Edinburgh February 18th. Capital £200. Objects: To carry on the business of general, constructional, electrical, wireless, mechanical, civil, mining, consulting and other engineers, etc. A. Martin, Ladymuir Farm, Kilbarchan, Renfrewshire, signs as director.

**Thornton Products, Ltd.**—Private company. Registered February 22nd. Capital £2,500. Objects: To acquire the business of electrical fittings manufacturers carried on by Walter and Alice Mitchell, as "Mitchell and Co.," and to carry on the business of electrical and mechanical engineers, lighting specialists and contractors, etc. Subscribers: H. H. Armytage, 36, Marlboro' Road, Bradford, and R. C. Yablon, 17, Bridge Street, Bradford. Solicitor: R. C. Yablon.

**Cables & Plastics, Ltd.**—Private company. Registered February 15th. Capital £2,000. Objects: To acquire the business of scientific instrument makers and makers of electric cables and plastic materials formerly carried on by W. Bowen, as the "Cables & Plastics Co." at 9, Newton Road, Leeds. The directors are: W. Bowen, governing director, and Sheila G. Bowen, both of 456, Harrogate Road, Leeds, 7, and R. B. Holt, 135, Alwoodley Lane, Leeds (all directors of Bowen Instrument Co., Ltd). Registered office: 9, Newton Road, Leeds, 7.

**Subkis Bros., Ltd.**—Private company. Registered February 15th. Capital £2,000. Objects: To carry on the business of manufacturers of, and dealers in, radio or electrical goods, gramophone sets, accessories, etc. The subscribers are: Jeannie Domnitz, 29, East Bank, N.16., clerk, A. Kirschenbaum, 42, Bromehead Street, E.1., clerk. Secretary: D. Freeman. Registered office: Cobbold Estate, Cobbold Road, Willesden, N.W.10.

**Waterloo Electric Supplies, Ltd.**—Private company. Registered February 20th. Capital £100. Objects: To carry on the business of manufacturers of and dealers in electrical and radio goods and accessories, refrigerators, cookers, washers, boilers, gramophones, neon signs, etc. Directors: A. Sharp, 30, Waterloo Road, Cheetham, Manchester, and F. Bolloten, The Glen, New Hall Road, Broughton Park, Salford. Registered office: 30, Waterloo Road, Cheetham, Manchester.

### New Patents (*Concluded from page 445*)

28071. "Insulated electric conductors." Philips Lamps, Ltd. October 19th, 1938. (533196.)

28131. "Piezo-electric apparatus." Standard Telephones & Cables, Ltd. November 3rd, 1938. (533204.)

28201. "Electric battery lamps." G. A. Mansill. October 19th, 1939. (Cognate application 31128/39.) (533209.)

28257. "Electrolytic condensers." Philips Lamps, Ltd. October 22nd, 1938. (533233.)

28260. "Flashlights and attachments therefor." Platers & Stampers, Ltd. April 17th, 1939. (533234.)

28285. "Metallic vapour electric discharge apparatus." English Electric Co., Ltd. October 19th, 1938. (533236.)

28369. "Electron discharge device utilising negative transconductance." Marconi's Wireless Telegraph Co., Ltd. October 22nd, 1938. (533241.)

28371. "High-frequency multiplex receiver systems." Telefunken Ges. für Drahtlose Telegraphie. October 21st, 1938. (533242.)

28464. "Electric discharge devices particularly for use in the starting circuit of gaseous electric discharge lamps." Westinghouse Electric International Co. November 29th, 1938. (533249.)

28470. "Arrangements in dry rectifiers mounted in cubicles." Allmanna Svenska Elektriska Aktiebolaget. October 24th, 1938. (533251.)

28509. "Arrangements for controlling the damping of oscillatory circuits." Philips Lamps, Ltd. October 25th, 1938. (533253.)

28510. "Thermionic amplifiers with negative feedback and volume control." Philips Lamps, Ltd. October 26th, 1938. (533254.)

28511. "Audio frequency amplifiers with inverse feed back." Philips Lamps, Ltd. October 26th, 1938. (533255.)

28715. "X-ray tubes." British Thomson-Houston Co., Ltd. October 26th, 1938. (533267.)

28769. "Means for deriving a voltage dependent upon the mean voltage of a modulated carrier wave, for example, for automatic gain control purposes." C. J. W. Hill and J. W. Smith. October 26th, 1939. (533275.)

28814. "Electric lamp adaptors." British Thomson-Houston Co., Ltd. October 28th, 1938. (533280.)

28830. "Measurement of phase shift." Standard Telephones & Cables, Ltd. November 16th, 1938. (533282.)

28833. "Insulating bushings." Westinghouse Electric International Co. October 28th, 1938. (533283.)

**A. E. Farr (Plant Hire), Ltd.**—Private company. Registered February 19th. Capital £10,000. Objects: To carry on the business of letting on hire boilers, turbines, winding engines, haulage plant, dynamos, motors, electrical equipment, etc. Directors: A. E. Farr, Wye House, Marlborough, and three others. Registered office: The Ham, Westbury, Wilts.

## Companies' Returns

### Statements of Capital

**Bradford Electrical Services, Ltd.**—Capital £5,000 in 5,000 shares of £1 each. Return dated July 4th, 1940. All shares taken up. £5,000 paid. Mortgages and charges: Nil.

**C. T. Briscoe & Son, Ltd.**—Capital £5,000 n 5,000 shares of £1 each. Return dated July 6th, 1940. 2,750 shares taken up. £860 paid. £1,890 considered as paid. Mortgages and charges: £1,000.

**Anglo-Argentine Tramways Co., Ltd.**—Capital £11,000,000 in 800,000 first preferred and 710,000 second preferred shares of £5 each and 862,500 ordinary shares of £4 each. Return dated August 23rd, 1940. 640,000 first preferred, 610,000 second preferred and 675,000 ordinary shares taken up. £850,000 paid. £8,100,000 considered as paid. Mortgages and charges: £12,269 7s. 4d.

**Electroflo Meters, Ltd.**—Capital £21,000 in 10s. shares. Return dated August 23rd, 1940. All shares taken up. £11,000 paid. £10,000 considered as paid. Mortgages and charges: Nil.

**Cox-Cavendish Electrical Co., Ltd.**—Capital £6,000 in 6,000 ordinary shares of £1 each. Return dated August 3rd, 1940. 4,344 shares taken up. £4,344 paid. Mortgages and charges: Nil.

**North Cheshire Electric Co., Ltd.**—Capital £500 in £1 shares. Return dated August 31st, 1940. 400 shares taken up. £200 paid. £200 considered as paid. Mortgages and charges: Nil.

**Horace Grensted, Ltd.**—Capital £2,000 in 2,000 shares of £1 each. Return dated July 3rd, 1940. 1,500 shares taken up. £1,000 paid. £500 considered as paid. Mortgages and charges: Nil.

**Wade & Mills, Ltd.**—Capital £500 in £1 shares. Return dated August 14th (filed October 10th), 1940. All shares taken up. £500 paid. Mortgages and charges: Nil.

**Eckington Electric Supply Co., Ltd.**—Capital £5,000 in 5,000 shares of £1 each. Return dated August 15th, 1940. All shares taken up. £5,000 paid. Mortgages and charges: Nil.

**Watshams, Ltd.**—Capital £25,000 in £1 shares. Return dated August 8th, 1940. 15,500 shares taken up. £2,921 paid. £12,579 considered as paid. Mortgages and charges: Nil.

**Potteries Electrical Warehouse, Ltd.**—Capital £2,000 in £1 shares. Return dated September 16th, 1940. 1,225 shares taken up. £1,245 paid (including £20 paid on 200 forfeited shares). Mortgages and charges: Nil.

**Tungwire, Ltd.**—Capital £6,000 in 4,000 preference and 2,000 ordinary shares of £1 each. Return dated September 26th, 1940. All shares taken up. £6,000 paid. Mortgages and charges: Nil.

**Denham & Son (Electrical Engineers), Ltd.**—Capital £500 in £1 shares. Return dated October 8th, 1940. 302 shares taken up. £302 paid. Mortgages and charges: Nil.

**Donn Electric Co., Ltd.**—Capital £500 in 500 shares of £1 each. Return dated October 9th, 1940. 400 shares taken up. £400 paid. Mortgages and charges: Nil.

### Mortgages and Charges

**Etna Lighting & Heating Co., Ltd.**—Charge on moneys due under a contract, dated January 27th, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

**Electrical Finance and Securities Co., Ltd.**—Satisfaction to the extent of £6,295 on November 1st, 1940, of trust deeds dated July 29th, 1927, July 6th, 1928, April 24th, 1930, and January 29th, 1932, and registered July 29th, 1927, July 10th, 1928, April 29th, 1930, and February 7th, 1932, respectively. (Notice filed February 7th, 1941).

**Albert Mann's Engineering Co., Ltd.**—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated January 23rd, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

**W. S. Westin, Ltd.**—Debenture, charged on the company's undertaking and property present and future, including uncalled capital, dated January 10th, 1941, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

**R. B. Page & Co., Ltd.**—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated January 27th, 1941, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

## Bankruptcies

**W. J. Williams,** electrical engineer, 81, High Street, Pwllheli.—Trustee, Mr. I. D. Hooson, St. Peter's Churchyard, The Cross, Chester, Official Receiver, released February 12th.

**R. A. J. Tully,** electrician, 32J, Viaduct Road, Brighton.—Application for discharge to be heard on March 20th, at the Court House, Brighton.

### Receiver Released

**Ismay Dirks Appliances, Ltd.,** engineers, electricians, etc.—F. E. Langhelt, Sterling Works, Dagenham, ceased to act as receiver on January 27th.

### Winding-up Petitions

**Grove Battery Works, Ltd.**—In the Companies Court, Chancery Division last week, Mr. Justice Simonds had before him a petition for the compulsory winding up of this company.

Mr. Lindner for petitioners said this was a creditors' petition for compulsory winding up of the company, the debt being £175, money alleged to have been advanced to the company. The company was incorporated in January, 1940.

Mr. Jennings opposed the petition on behalf of creditors and debenture holders for £2,000.

His Lordship stood the matter over till next sitting, for the petitioners to establish their debt.

**Architectural Constructional & Electrical Utilities, Ltd.**—In the Companies Court, Chancery Division, last week, Mr. Justice Simonds had again before him the petition for the compulsory winding up of this company.

Council for the petitioners said the petition had stood over for a week to enable the company to offer some proposal, but nothing had transpired.

The company did not appear, and there was no opposition. His Lordship made the usual compulsory order.

# In the Courts

### Merchandise Marks Act Invoked

IN the King's Bench Division on February 27th, Mr. Justice Tucker gave judgment in an action brought by the London Armoury Co., Ltd., against the Ever Ready Co. (Great Britain), Ltd., claiming an injunction and damages. The plaintiffs, who are importers of electric torch batteries, alleged that the defendants imported batteries and sold them under the trade mark "Ever Ready" without indicating their origin in breach of the Merchandise Marks Act. By this, the plaintiffs stated, they had been subjected to unfair competition and had suffered damage provisionally put at £6,000.

The defendants denied the allegations, stating that the batteries alleged to have been sold by them were not in any event imported goods within the meaning of the Act. They therefore maintained that no cause of action had been disclosed.

In the course of his judgment, Mr. Justice Tucker said that a breach of statutory duty under Section 5 of the Act was punishable by a fine. But he had to look at the Act as a whole to see if it was the intention of the Legislature that persons suffering could have damages or an injunction in addition to enforcing a summary conviction. Having done this he came to the conclusion that the Act was designed to protect the whole trade in the general interest of the country; he could find nothing in it to suggest that any person who suffered damage by breaches of the Act could have a remedy in addition to that provided by Section 5. Therefore, in his view the plaintiffs could not maintain the position which they had taken up. Plaintiffs having disregarded recourse to a petty sessional court, their remedy was through the Attorney-General by way of injunction. He thought that the defence was good and valid and that the statement of claim disclosed no cause of action.

He dismissed the action, with costs, and gave plaintiffs' counsel leave to appeal.

### Disputed Torch Battery Contract

In the King's Bench Division recently, Mr. Justice Atkinson heard an action by Roditi Bros., Ltd., of Bishopsgate, London, against Splendor, Ltd., of Beachmarket Hill, Nottingham, to recover a sum of £91, the price of goods bargained and sold. In the alternative the plaintiffs claimed £133 for breach of contract to pay for and take a certain consignment of electric batteries for torches which were being shipped from the United States in the early part of last year. Defendants denied any breach of contract and pleaded that the goods were tendered and counter-claimed for damages.

His Lordship, in giving judgment, found that there was a contract between the plaintiffs and the defendants. The defendants were under a contractual obligation to take the goods and there was a breach by them in February. The plaintiffs did not get the goods so as to make a profit. They should have got the goods in February, but they did not arrive till a later date. Under these circumstances he held that the plaintiffs were entitled to recover the sum of £91, which was an agreed sum, if he found in the plaintiffs' favour. From that sum must be deducted £4 4s. 0d. compensation to the defendants for a drop in price in respect of the late arrival of certain batteries. Plaintiffs were therefore entitled to £86 16s. and he gave judgment for them for that amount, with costs. He dismissed the counter-claim with no order as to costs.

# STOCKS AND SHARES

TUESDAY EVENING.

THE inspiring news from the Near East and the rapid sweep forward of British forces in Somaliland, would have exercised a greater influence over Stock Exchange prices than they have done, had it not been for the bogey of invasion which is so frequently referred to by responsible speakers. This it is which serves to restrain capital from entering the markets in search of investments which, already far from plentiful, might have to be rationed, according to one jester, if there were to be a general release of the money that is known to be available for employment in Stock Exchange securities.

Business is, however, very quiet. The number of officially-recorded bargains every day represents an average of about one deal to every member of the House. Prices hold their ground. The opening of the dividend season in the electricity supply group of companies produced a surprise in the shape of a 3 per cent. reduction in the Northmet Power Company's distribution on its ordinary shares.

### Thomas Tilling

On the face of it, the price of Thomas Tilling shares at 41s. 3d. looks high enough, in the light of the 10 per cent. dividend the company is paying and the modest yield of £4 17s. which this permits at the current price of the shares. The chairman pointed out at the recent meeting that the total interest paid last year on the stocks which the company was allotted in consideration for the London omnibus business transferred to the Board, came to £48,424. This goes against average net profits of the business for the last three years, under the Tilling management and control, of something over £150,000 per annum. It is obvious from a study of the company's holdings, that the scope for expansion of profits, as soon as happier days return, is very considerable. Three times in recent years Thomas Tilling made an issue of shares, either free or on bonus terms, but any such "melon-cutting" is out of the question during the period of the war. The increase to 3 per cent. in the dividend on Transport "C" stock makes a bull point for Thomas Tilling shares.

### Home Railway Considerations

Home Railway prices are in a curious state of flux. The buoyancy shown by the market on the eve of the dividend declarations was abruptly checked by a considerable volume of selling that followed upon announcement of distributions as favourable as anyone had expected. Prices went back fairly sharply, to rally again as what are called the bargain hunters came in at the lower levels.

The high returns offered by the stocks at the current levels can hardly fail to secure support for the stocks from the ordinary investor. Southern 5 per cent. preferred gives ten guineas per cent. at the present price of 47½. The same company's 5 per cent. preference—which is eligible for trustees—yields 6 per cent. at 83¼. London Passenger Transport "C" at 34 affords £8 16s. 6d. per cent. All prices are ex dividend.

### Electricity Supply Dividends

The reduction in the dividend on Bournemouth & Poole ordinary shares from 15 per cent. to 12½ per cent. had been expected. The cut in the interim dividend prepared the way for a reduced final. The shares at the present price, and on the basis of the 12½ per cent. distribution, give a return of 5½ per cent. Richmond Electric is considered to have done well in maintaining its 6 per cent. dividend and the shares at anything like 18s. 9d., the middle price, look relatively cheap. That the City of London Electric should have reduced its year's dividend by no more than ½ per cent. to 7 per cent. for the year, is a relief. A surprise announcement is the lowering of the dividend on Northmet Power ordinary shares from 10 per cent. to 7 per cent. The price fell 2s. 6d. to 30s. on the declaration. There are 1,000 Northmet 4 per cent. preference shares on offer in the market at a guinea. Dividends are payable at the end of April and October. The yield at this price is no higher than £3 16s. per cent., but the cover is ample. In view of the readiness with which investment takes what may be called gilt-edged industrial securities standing near to the par value, the shares, although the price looks very high, will probably attract purchasers.

Mid-Cheshire 4 per cent. preference, quoted at 20s., could probably be bought about 20s. 6d. At the latter price, they would return £3 18s. per cent. It is somewhat astonishing that investors should be content to accept such comparatively modest returns from industrial investments, however sound, but the pressure is both persistent and insistent. It comes, moreover, upon a market where the supply of shares is scanty and where there are, of course, no new issues being made.

### "Tons of Money"

On the 24th of this month the Treasury will begin to pay the money in respect of the six issues of India Government stocks that have been requisitioned under the vesting Order. The operation brings into circulation such large amounts of money as to have already exercised some effect upon prices in the purely investment markets. The British Treasury offer facilities to holders of these India stocks for their money to be diverted into one or other of the national War Loans, but while the latter will attract the greater part of the money, a certain amount will be required to earn a higher rate of interest. The full effect of the operation will not be felt until later on, because many people prefer to wait until they have actually received cash before they spend it in fresh investments. With this in mind, the market for gilt-edged securities cannot fail to hold its prices. Central Electricity 3½ per cent. stock 1963-93 has hardened to 96. The other issues of the Board, and similar stocks in this group, show no quotable price changes, but they are so tenaciously held as to be extremely difficult to buy.

### Cable and Wireless Advance

For some reason so far unexplained, Cable and Wireless stocks enjoyed a sudden spurt towards the end of last week, when buyers appeared both for the preference and the ordinary issues. For some weeks past the market had lain in a lethargic condition. Two or three buyers came in simultaneously, however, and this had an immediate effect upon the prices, the ordinary rising to 55, the preference to 97. As recently mentioned, the dividend will be announced next month and the market looks for a repetition of the previously-paid 4 per cent. for the year on the ordinary stock. The preference receives its dividend half-yearly, the ordinary only once a year, and if 4 per cent. should be declared on the latter, as is generally expected, the return at the present price, and allowing for accumulated dividend, would be nearly 7½ per cent.

### Miscellaneous Matters

The few movements which have taken place in the market for equipment and manufacturing shares are mostly downward, though an exception is provided by Falk, Stadelmann ordinary, which have risen to 15s. 9d. British Insulated have eased off to £4. Babcock & Wilcox at 40s., and Westinghouse Brake at the same price, are both easier. International Combustion are ⅛ down at 87s. 6d. Hall Telephone shares gave way to 10s. Movements in the ordinary shares of the Home electricity supply group, apart from those already mentioned, are of no outstanding significance. Yorkshire Electrics are 6d. higher at 36s. 3d. A continued feature is the demand for preference shares, the effect of which is seen in an almost daily improvement in quotations.

### Victoria Falls Preference

Buyers have again come forward wanting the offer of Victoria Falls 6 per cent. participating preference shares, now in receipt of the full 10 per cent. to which they are entitled. The company is doing so well that no doubt is entertained as to the continuance of the 10 per cent. dividend, and at 37s., the nominal quotation, the return of £5 11s. per cent. would be considered attractive were it not for the proviso attaching to the company's preference as to what may happen in 1948. In that year, the Governor-General of the Union of South Africa has the right to give notice that two years after—in 1950—the company can be taken over as a going concern by the Government. Nobody knows the terms which, if this option were exercised, would be given to the shareholders of the company.

The preference shares are of the nominal value of £1 each. It is conceivable that they might be taken over on what would be the equivalent basis of 20s. Nothing definite can be stated on the point, but the present holders of the shares, and the prospective buyers should bear in mind this possibility of capital loss which might be sustained if the preference were paid off at 20s. The ordinary shares occupy a very different position, and although the return at the present price appears to be small, the stability of the company, and its excellent record, justify the confidence with which the shares are held by investors. At 75s., with a gain of 1/16 on the week, the price is very near the top figure reached last year.

# ELECTRICAL COMPANIES' SHARES

## *Prices, Dividends and Yields*

| Company | 1940 Highest | 1940 Lowest | Dividend previous | Dividend Last | Middle Price March 3 | Rise or Fall | Yield £ s. d. |
|---|---|---|---|---|---|---|---|
| **Home Electricity Companies** | | | | | | | |
| Bournemouth and Poole | 63/6 | 36/6 | 15 | 12½ | 47/6 | .. | 5 5 3 |
| British Power and Light | 30/- | 20/- | 7 | 7 | 27/6 | +1/- | 5 1 10 |
| City of London | 28/- | 20/- | 7½ | 7 | 21/3 | .. | 6 11 9 |
| Clyde Valley | 38/6 | 24/- | 8 | 8 | 35/- | .. | 4 11 5 |
| County of London | 43/3 | 21/- | 10½ | 8 | 31/3 | .. | 5 2 5 |
| Edmundson's: | | | | | | | |
| 7% Pref. | 32/- | 24/3 | 7 | 7 | 28/3 | .. | 4 19 1 |
| Ord. | 27/6 | 18/6 | 9 | 6 | 24/6 | .. | 4 18 0 |
| Elec. Dis. Yorkshire | 40/3 | 32/- | 9 | 9 | 36/3 | .. | 4 19 4 |
| Elec. Fin. and Securities | 42/- | 34/6 | 12½ | 12½ | 40/- | .. | 6 5 0 |
| Elec. Supply Corporation | 48/- | 39/- | 12 | 11½ | 37/- | .. | 6 4 4 |
| Isle of Thanet | 16/- | 5/6 | 4 | 4 | 7/- | +1/- | — |
| Lancs Light and Power | 33/- | 21/6 | 7½ | 7½ | 28/9 | .. | 5 4 4 |
| Llanelly Elec. | 21/- | 17/- | 5½ | 5½ | 20/- | .. | 5 10 0 |
| Lond. Assoc. Electric | 21/- | 12/6 | 7 | 5½ | 13/9 | .. | — |
| London Electric | 35/- | 19/- | 7 | 7 | 22/6 | .. | 6 4 5 |
| London Power Deb. Red | 105½ | 100 | 5 | 5 | 104½ | .. | 4 15 6 |
| Metropolitan | 41/6 | 22/6 | 12 | 10 | 33/9 | .. | 5 18 6 |
| Midland Counties | 39/- | 23/3 | 8 | 8 | 34/6 | +9d. | 4 12 10 |
| Mid. Elec. Power | 40/- | 29/6 | 9 | 9 | 33/9 | .. | 5 6 8 |
| Newcastle Elec. | 29/9 | 22/6 | 7 | 7 | 25/- | .. | 5 12 0 |
| North Eastern Elec.: | | | | | | | |
| Ordinary | 31/6 | 16/6 | 7 | 7 | 27/- | .. | 5 3 9 |
| 7% Pref. | 32/6 | 25/6 | 7 | 7 | 30/- | .. | 4 13 4 |
| Northampton | 44/- | 38/- | 10 | 10 | 40/- | .. | 5 0 0 |
| Notting Hill 6% Pref. (£10) | 10½ | 9 | 6 | 6 | 8½ | .. | — |
| Northmet Power: | | | | | | | |
| Ordinary | 42/3 | 22/6 | 10 | 17 | 30/- | −½ | 4 13 4 |
| 6% Pref. | 29/- | 23/- | 6 | 6 | 28/6 | +6d. | 4 4 3 |
| Richmond Elec. | 24/6 | 18/- | 6 | 6 | 18/9 | .. | 6 8 0 |
| Scottish Power | 38/- | 24/- | 8 | 8 | 34/6 | .. | 4 12 9 |
| Southern Areas | 21/3 | 12/9 | 5 | 5 | 16/3 | .. | 6 3 1 |
| South London | 23/3 | 20/- | 7 | 7 | 20/- | .. | 7 0 0 |
| West Devon | 20/- | 17/6 | 5 | 5 | 20/- | .. | 5 0 0 |
| West Glos. | 22/- | 15/- | 2½ | 4½ | 16/3 | .. | 5 10 10 |
| Yorkshire Elec. | 40/- | 23/6 | 8 | 8 | 36/3 | +6d. | 4 8 5 |
| **Overseas Electricity Companies** | | | | | | | |
| Atlas Elec. | 4/- | 1/3 | Nil | Nil | 2/- | .. | — |
| Calcutta Elec. | 37/- | 22/6 | 10* | 8* | 35/- | .. | 4 11 5 |
| Cawnpore Elec. | 30/- | 24/- | 10 | 10 | 27/6 | .. | 7 5 6 |
| East African Power | 25/6 | 19/6 | 7 | 7 | 25/- | .. | 5 12 0 |
| Jerusalem Elec. | 24/- | 15/- | 7 | 7 | 21/3 | .. | 6 11 9 |
| Kalgoorlie (10/-) | 12/6 | 9/6 | 7½ | 7½ | 12/- | .. | 6 5 0 |
| Madras | 26/9 | 21/6 | 8* | 6* | 25/- | .. | — |
| Montreal Power | 35½ | 30 | 1½ | 1½ | 28½ | .. | 5 5 3 |
| Palestine Elec. "A" | 25/- | 10/- | 5* | Nil | 20/- | .. | — |
| Perak Hydro-electric | 20/3 | 13/- | 2½ | 6 | 17/- | .. | 7 1 2 |
| Shawinigan Power | 27½ | 19 | 83cts. | 90cts. | 18½ | .. | — |
| Tokyo Elec. 6% | 69 | 30 | 6 | 6 | 38½ | −1 | 15 11 8 |
| Victoria Falls Power | 75/9 | 56/6 | 15 | 15 | 75/- | +⅛ | 4 0 0 |
| Whitehall Investments Pref. | 17/9 | 8/- | 7½ | 7½ | 14/6 | .. | 10 6 10 |
| **Public Boards** | | | | | | | |
| Central Electricity | | | | | | | |
| 1950-70 | 110½ | 104 | 5 | 5 | 109 | .. | 4 11 9 |
| 1955-75 | 112½ | 106 | 5 | 5 | 112 | .. | 4 9 3 |
| 1951-73 | 107½ | 102 | 4½ | 4½ | 107 | .. | 4 4 0 |
| 1963-93 | 96½ | 90 | 3½ | 3½ | 96 | +1 | 3 13 0 |
| 1974-94 | 91 | 79½ | 3½ | 3½ | 89 | .. | 3 13 0 |
| London Elec. Trans. Ltd. | 92 | 87½ | 2½ | 2½ | 93 | .. | 2 15 9 |
| London & Home Counties | | | | | | | |
| 1955-75 | 113½ | 105 | 4½ | 4½ | 105½ | .. | 4 5 4 |
| Lond. Passenger Transport | | | | | | | |
| A | 116 | 104 | 4½ | 4½ | 111½ | .. | 4 0 9 |
| B | 116 | 102½ | 5 | 5 | 106 | .. | 4 14 4 |
| C | 65½ | 25 | 1½ | 3 | 34 | .. | 8 16 6 |
| West Midland Joint Elec. | | | | | | | |
| 1948-68 | 106½ | 103 | 5 | 5 | 105½ | .. | 4 14 9 |
| **Telegraph and Telephone** | | | | | | | |
| Anglo-Am. Tel.: | | | | | | | |
| Pref. | 107 | 85 | 6 | 6 | 100½ | .. | 5 19 3 |
| Def. | 23½ | 18 | 1½ | 1½ | 23½ | .. | 6 7 8 |
| Anglo-Portuguese | 22/6 | 10/- | 8 | 8 | 15/- | .. | 10 13 4 |
| Cable & Wireless: | | | | | | | |
| 5½% Pref. | 99½ | 66 | 4½ | 5½ | 97 | +1½ | 5 13 5 |
| Ord. | 65 | 27 | 4 | 4 | 55 | +1 | 7 5 6 |
| Canadian Marconi $1 | 6/- | 4/- | Nil | 4cts. | 5/- | .. | — |
| Globe Tel. & Tel.: | | | | | | | |
| Ord. | 32/6 | 21/6 | 7½* | 6* | 27/6 | .. | 4 7 3 |
| Pref. | 27/9 | 22/6 | 6 | 6 | 27/6 | .. | 4 7 3 |
| Great Northern Tel. (£10) | 20 | 11 | 20 | 20 | 12½ | .. | — |
| Inter. Tel. & Tel. | 5½ | 2½ | Nil | Nil | 3 | .. | — |
| Marconi-Marine | 30/- | 18/3 | 10 | 7½ | 22/6 | | 6 13 3 |
| Oriental Telephone Ord. | 2⅞ | 45/- | 12* | 11½* | 2 7/16 | .. | 4 14 3 |
| Telephone Props. | 15/- | 11/- | 6 | 6 | 11/3 | .. | 10 13 4 |
| Telephone Rentals (5/-) | 9/6 | 5/3 | 10 | 10 | 7/3 | .. | 6 18 0 |

| Company | 1940 Highest | 1940 Lowest | Dividend previous | Dividend Last | Middle Price March 3 | Rise or Fall | Yield £ s. d. |
|---|---|---|---|---|---|---|---|
| **Traction and Transport** | | | | | | | |
| Anglo. Arg. Trans: | | | | | | | |
| First. Pref. (£5) | 4/3 | 1/- | Nil | Nil | 2/- | .. | — |
| 4% Inc. | 11½ | 2 | Nil | Nil | 6½ | .. | — |
| British Electric Traction: | | | | | | | |
| Def. Ord. | 830 | 400 | 5 | 45 | 800 | .. | 5 12 6 |
| Pref. Ord. | 169 | 130 | 8 | 8 | 150 | .. | 5 6 8 |
| Bristol Trams | 48/6 | 32/6 | 8* | 8 | 35/- | .. | 4 11 5 |
| Brazil Traction | 12½ | 5½ | $1 | 50c. | 7 | .. | — |
| Calcutta Trams | 24/- | 16/3 | 8 | 5½ | 19/- | .. | 5 15 8 |
| Cape Elec. Trams | 18/6 | 16/- | 5 | 5 | 17/- | .. | 5 17 4 |
| Lancs Transport | 35/- | 27/6 | 10 | 10 | 35/- | .. | 5 14 3 |
| Mexican Light: | | | | | | | |
| 1st Bonds | 36 | 25 | 5 | 5 | 35 | .. | — |
| Rio 5% Bonds | 95 | 74 | 5 | 5 | 85 | .. | 5 17 8 |
| Southern Rly.: | | | | | | | |
| 5% Prefd. | 79 | 35 | 5 | 5 | 47½xd. | .. | 10 10 6 |
| 5% Pref. | 104½ | 59 | 5 | 5 | 83½xd. | −2 | 5 19 9 |
| T. Tilling | 45/9 | 29/- | 10 | 10 | 41/3 | .. | 4 17 0 |
| Tilling & B.A. | 47/6 | 41/9 | 9* | 8* | 44/6 | .. | — |
| West Riding | 35/- | 25/- | 10 | 10 | 35/- | .. | 5 14 3 |
| **Equipment and Manufacturing** | | | | | | | |
| Aron Electricity Ord. | 17/6 | 10/- | 15 | Nil | 16/- | .. | — |
| Assoc. Elec. | | | | | | | |
| Ord. | 43/3 | 26/6 | 10 | 10 | 40/- | .. | 5 0 0 |
| Pref. | 36/6 | 32/3 | 8 | 8 | 35/- | .. | 4 11 5 |
| Automatic Telephone & El. | 47/3 | 32/- | 12½ | 12½ | 43/9 | .. | 5 14 1 |
| Babcock & Wilcox | 50/- | 28/6 | 10 | 11 | 40/- | −9d. | 5 10 0 |
| British Aluminium Ord. | 56/- | 29/- | 12½ | 12½ | 40/9 | −6d. | — |
| British Insulated Ord. | 92/6 | 67/- | 20 | 20 | 80/- | −⅛ | 5 0 0 |
| British Thermostat (5/-) | 14/9 | 6/6 | 18½ | 18½ | 11/3 | .. | 8 4 6 |
| British Vacuum Cleaner (5/-) | 12/- | 4/9 | 40 | 12½ | 6/3 | .. | 10 0 0 |
| Brush Ord. | 4/6 | 1/9 | Nil | Nil | 4/- | .. | — |
| Callender's | 69/- | 46/- | 15 | 15 | 62/6 | .. | 4 16 0 |
| Chloride Elec. Storage | 72/6 | 55/- | 15 | 15 | 62/6 | .. | 4 16 0 |
| Consolidated Signal | 72/6 | 59/- | 17 | 17 | 65/- | .. | 5 4 7 |
| Crabtree (10/-) | 24/9 | 17/6 | 17½ | 17½ | 22/6 | .. | 7 15 7 |
| Crompton Parkinson: | | | | | | | |
| Ord. (5/-) | 20/- | 12/- | 30 | 20 | 18/9 | .. | 5 6 8 |
| E. K. Cole (5/-) | 5/- | 2/6 | 10 | Nil | 4/- | .. | — |
| Elec. & Musical Industries (10/-) | 10/3 | 4/3 | 5 | Nil | 7/6 | .. | — |
| Electric Construction | 36/3 | 27/6 | 13½ | 10 | 27/6 | .. | 7 5 6 |
| Enfield Cable Ord. | 56/- | 40/6 | 25 | 16½ | 50/- | .. | 6 10 0 |
| Electrical Switchgear (10/-) | 22/6 | 20/- | 16 | 10 | 20/- | .. | 5 0 0 |
| English Electric | 33/9 | 16/6 | 10 | 10 | 30/- | .. | 6 13 4 |
| Ensign Lamps (5/-) | 15/3 | 12/6 | 25 | 25 | 15/- | .. | 8 6 3 |
| Ericsson Tel. (5/-) | 39/3 | 23/- | 25* | 25* | 32/6 | .. | — |
| Ever Ready (5/-) | 28/3 | 16/6 | 30 | 40 | 26/- | .. | 7 14 0 |
| Falk Stadelmann | 18/3 | 12/6 | 6 | 7 | 15/9 | +⅛ | 8 17 10 |
| Ferranti Pref. | 25/- | 22/- | 7 | 7 | 25/- | .. | 5 12 0 |
| G.E.C.: | | | | | | | |
| Pref. | 32/6 | 26/- | 6½ | 6½ | 32/6 | .. | 4 0 0 |
| Ord. | 83/3 | 53/3 | 20 | 20 | 78/9 | .. | 5 1 6 |
| Greenwood & Batley | 25/6 | 20/- | 15 | 13 | 20/- | .. | 13 0 0 |
| Hall Telephone (10/-) | 18/6 | 8/9 | 15 | 10 | 10/- | −⅛ | 10 0 0 |
| Henley's (5/-) | 21/6 | 12/6 | 20 | 20 | 20/- | .. | 5 0 0 |
| 4½% Pref. | 21/2 | 20/6 | 4½ | 4½ | 21/3 | .. | 4 4 8 |
| Hopkinsons | 46/9 | 32/6 | 15 | 15 | 38/9 | .. | 7 14 8 |
| India-Rubber Pref. | 21/- | 19/6 | 5½ | 5½ | 21/3 | .. | 5 3 6 |
| Intl. Combustion | 121/3 | 70/- | 32½ | 30 | 43/8 | −½ | 6 17 0 |
| J. Lucas | 60/6 | 40/- | 15 | 15 | 55/- | .. | 5 9 1 |
| Johnson & Phillips | 50/9 | 32/6 | 12½ | 15 | 45/- | .. | 6 13 4 |
| Lancashire Dynamo | 59/9 | 47/6 | 25 | 20 | 52/6 | .. | 7 12 4 |
| Laurence Scott (5/-) | 11/- | 6/- | 15 | 15 | 7/- | .. | 10 14 2 |
| London Elec. Wire | 25/6 | 20/- | 7½ | 7½ | 22/6 | .. | 6 13 4 |
| Mather & Platt | 46/6 | 30/- | 13½ | 10 | 37/6 | .. | 5 6 8 |
| Metropolitan Elec. Cable Pf. | 22/- | 21/3 | 5½ | 5½ | 21/3 | .. | 5 3 6 |
| Murex | 86/9 | 52/6 | 20 | 20 | 76/3 | .. | 5 5 0 |
| Pye Deferred (5/-) | 9/- | 6/9 | 25 | 25 | 10/- | .. | 14 5 8 |
| Revo (10/-) | 20/9 | 11/6 | 17½ | 5 | 20/- | .. | 2 10 0 |
| Revrolle | 60/6 | 41/- | 12½ | 12½ | 50/- | .. | 5 0 0 |
| Siemens Ord. | 23/9 | 15/6 | 7½ | 7½ | 20/- | .. | 7 10 0 |
| Strand Elec. (5/-) | 2/3 | 9d. | 4 | 2 | 1/9 | .. | 5 14 4 |
| S. Smith (1/-) | 8/- | 3/6 | 37½ | 50 | 6/3 | −⅛ | 8 0 0 |
| Switchgear & Cowans (5/-) | 11/9 | 5/6 | 20 | 10 | 8/9 | .. | 5 14 3 |
| Telegraph Condenser (10/-) | 8/9 | 6/3 | 5 | .. | 7/6 | .. | — |
| Telegraph Construction | 42/6 | 29/- | 10 | 10 | 36/3 | .. | 5 10 6 |
| Telephone Mfg. (5/-) | 9/- | 5/- | 9 | 9 | 7/- | .. | 6 8 7 |
| Tube Investments | 96/9 | 59/- | 23½ | 23½ | 90/- | .. | 5 5 9 |
| Vactric (5/-) | 3/6 | 2/- | 4 | Nil | 2/3 | .. | — |
| Vickers (10/-) | 22/- | 9/6 | 10 | 10 | 15/- | .. | 6 13 4 |
| Ward & Goldstone (5/-) | 19/6 | 12/6 | 20 | 20 | 13/9 | .. | 7 5 6 |
| Westinghouse Brake | 46/- | 30/6 | 17½ | 10 | 40/- | −⅛ | 5 0 0 |
| Walsall Conduits (4/-) | 26/6 | 17/6 | 55 | 55 | 26/3 | .. | 8 7 6 |
| West, Allen (5/-) | 7/- | 3/- | 10½ | 7½ | 3/9 | .. | 10 0 0 |

*Dividends are paid free of Income Tax.

# CONTRACT INFORMATION

## *Tenders Invited and Accepted. Schemes Promising Electrical Work*

## Contracts Open

*Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Millbank, Westminster, London, S.W.1.*

**Belfast.**—March 10th. Town Council. Electrical equipment, etc., at various institutions. Forms of tender from the Medical Superintendent Officer of Health, Room 53, City Hall.

**Brierfield.**—March 13th. Electricity Department. 300 - kVA transformer, also 6,600-V metalclad switchgear. (February 21st.)

**Bury.**—March 17th. Electricity Department. Five 625-kVA transformers. (February 28th.)

**Edinburgh.**—March 11th. Electricity Department. Link disconnecting boxes. (February 28th.)

**Keighley.**—March 13th. Electricity Department. Motors, starters and high-voltage overhead line work. (February 28th.)

Education Committee. Part or the whole of the following work:—Lighting system, Municipal Hall; electric wiring, Stanbury School, Haworth; and electric wiring, Horkinstone School, Oxenhope. E. G. Felgate, borough architect, College Street. (Deposit: £1).

**Kingston - upon - Thames.** — March 10th. Borough Council. Eight centrifugal pumping sets with accessories. Conditions of contract and specification from John Taylor & Sons, Council's engineers, Caxton House, Tothill Street, Westminster, S.W.1. (Deposit: £2 2s.).

**Morecambe & Heysham.** — March 14th. Electricity Department. 6,000 kVA and 400 kVA indoor-type transformers. (February 21st.)

**South Africa.**—PRETORIA.—March 26th. City Council. Switchgear, transformers, reactors and auxiliary apparatus. (February 14th.)

April 2nd. City Council. Pipework equipment for the power station. (February 21st.)

CAPE TOWN.—March 31st. Electricity Department. 2,000 fuses. (T.15821/41.)* Ironclad service cut-outs. (T.15820/41.)*

JOHANNESBURG.—April 7th. City Electricity Department. Automatic fire-fighting equipment for switchgear and transformers. (T.15847/41.)*

April 15th. Railways and Harbours Administration. Automobile batteries. (T.15961/41.)*

**Southern Rhodesia.**—SALISBURY.—March 10th. City Electricity Department. 374 meters of various types. (T. 23645/40.)* Material for electrical distribution. (T.Y.15136/41.)*

Stores Department. March 28th. Electrically driven rendering vessel, etc., for municipal abattoir. (T.15135/41.)*

**Twrcelyn (Anglesey).** — March 20th. R.D.C. Various waterworks, including pumping and purification plant (contract 3). Specification and form of tender from Henry Adams & Son, consulting engineers, Fron Heulog, Bangor. (Deposit: £1).

**Wolverhampton.**—March 17th. Electricity Department. Paper insulated cables, compound and compounded insulating tapes. (February 7th.)

## Orders Placed

**Durham.**—County Public Assistance Committee. Accepted. Electrical installations in shelters at Institutions: Stockton Institution (£120).—Watson and Coates. Durham, Easington and Lanchester Institutions (£250).—T. Henderson. Shotley Bridge for Medomsley Cottage Homes (£66).—L. Urwin, Ltd.

**Greenock.**—CORPORATION HOUSING COMMITTEE. Accepted. Electric lighting in 54 houses in the John Street area (£730).—S. Denholm.

**Grimsby.**—Electricity Committee. Accepted. Transformer (£394).—Brush Electrical Engineering Co. Cables (£1,366).—Scottish Cables.

**Hendon.**—Town Council. Accepted. Electric lighting in communal surface shelters.—Northmet Power Co.; Knights (Hendon), Ltd.; B. S. Cooper; and E. F. Ferris & Son.

**London.**—WANDSWORTH.—Borough Council. Accepted. Installation of electrical equipment at two mortuaries (£100 and £135).—J. Lightfoot.

ST. PANCRAS.—Special Emergency Committee. Accepted. High-voltage switchgear for alternative means of supplying electricity to Carreras, Ltd. (£1,946); also repair or replacement of switchgear (£704). — A. Reyrolle & Co. Improvements to ventilating system at Montague Burton's shelters, Kentish Town Road (£102).—Sturtevant Engineering Co.

**South Shields.**— Cleansing Committee. Accepted. Battery (£224).—Britannia Batteries.

**Stoke-on-Trent.** — ELECTRICITY COMMITTEE. Accepted for 12 months:—Mains and cables.—Callender's. E.h.v. substation switchgear—Metropolitan-Vickers Electrical Co. Static transformers—English Electric Co.

## Contracts in Prospect

*Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

**Amble.**—Communal feeding centre. Applications to the surveyor, U. D. C. offices.

**Arklow.**—Erection of buildings, for the Irish Sea Fisheries Association, Ltd.

**Ayr.**—Messroom, etc. (£500); London Metallic Capsule Co., Ltd., 392, Rotherhithe Street, London, S. E. 16.

Additions (£400), 21 Ewenfield Road; John Crowley, 24, Blythswood Square, Glasgow.

**Barking.**—Factory buildings; William Warne & Co., Ltd.

**Brighton.** — Works additions; Pullars Electric Co., Ltd.

**Burnley.**—Adaptation of Holy Trinity Boys' School, as youth centre (£1,845), for E.C.; J. L. Beckett, borough engineer, Town Hall.

**Cork.**—Technical school, Mitchelstown (£6,000), for County Vocational E. C.; C. Harrington, town clerk, City Hall.

**Durham City.**—Conversion of Akley Heads House into an auxiliary hospital; Dixon Elliott & Sons, 51 Sunderland Road.

**Ealing.**—Building, North Circular Road; Swift Scale Co., Swift Works, North Circular Road, N.W. 10.

**Glasgow.**—Extensions, engineering works; A. D. Turner, Ltd.

Works additions; Bull's Metal & Melloid Co., Ltd.

Buildings; Limmer & Trinidad Lake Asphalt Co., Ltd.

**Gravesend.**—Police and fire station ground floor (£34,419), for T.C.; Ringmer Building Works, Ltd., Ringmer, near Lewes, East Sussex.

**Hampshire.**—Alterations, Park Prewitt & Knowle institutions (£10,000); county architect.

**Hertfordshire.**—Repair works, etc., at six schools, two hospitals, and cottages (£6,283), for C.C.; Clerk's Department, Castle Street, Hertford.

**Heston and Isleworth.**—Canteen (£1,719), Spring Grove Central School; town clerk, Council House, Hounslow.

**Hyde.**—Works additions; Simister & Chorlton.

**Letterkenny.**—Houses (12), for Donegal District Institution; C. V. McLaughlin, architect, Letterkenny, Co. Donegal.

**London.**—WESTMINSTER.—Equipment of Gloucester House for temporary hostel, for T. C.; city engineer and surveyor, City Hall, W.C.2.

LEWISHAM.—Rebuilding portion of factory; Holloway Bros. (London), Ltd., builders, Thurston Road.

**Loughborough.** — Communal shelters scheme (£90,000 to £100,000), for T. C.; W. Granger, borough engineer, Town Hall.

**Manchester.**—Alterations, Dr. Garrett's Memorial Home, and Rose Hill Convalescent Home, Northenden, for T. C.; G. N. Hill, city architect, Town Hall.

**Norton Riding.**—School kitchens and dining rooms (£3,600), Eston and Thornaby, for E. C.; J. W. White, county architect, County Hall, Northallerton.

**North Radstock.**—Fire station extensions for U.D.C.; W. J. Landray, clerk, Council Offices, Midsomer Norton.

**Perivale.**—Additions, Aintree Road; Suflex, Ltd.

**Rushden.**—Repairs, Alfred Street and Newton Road Schools (£7,300); Northants county architect.

**Shelton (Staffs.).**—Offices, Edward Street; Trionite, Ltd.

**Southgate.**—Works additions; Ruddock & Co.

**South Shields.**—Seven additional communal feeding centres; N. G. Richardson, borough engineer, Town Hall.

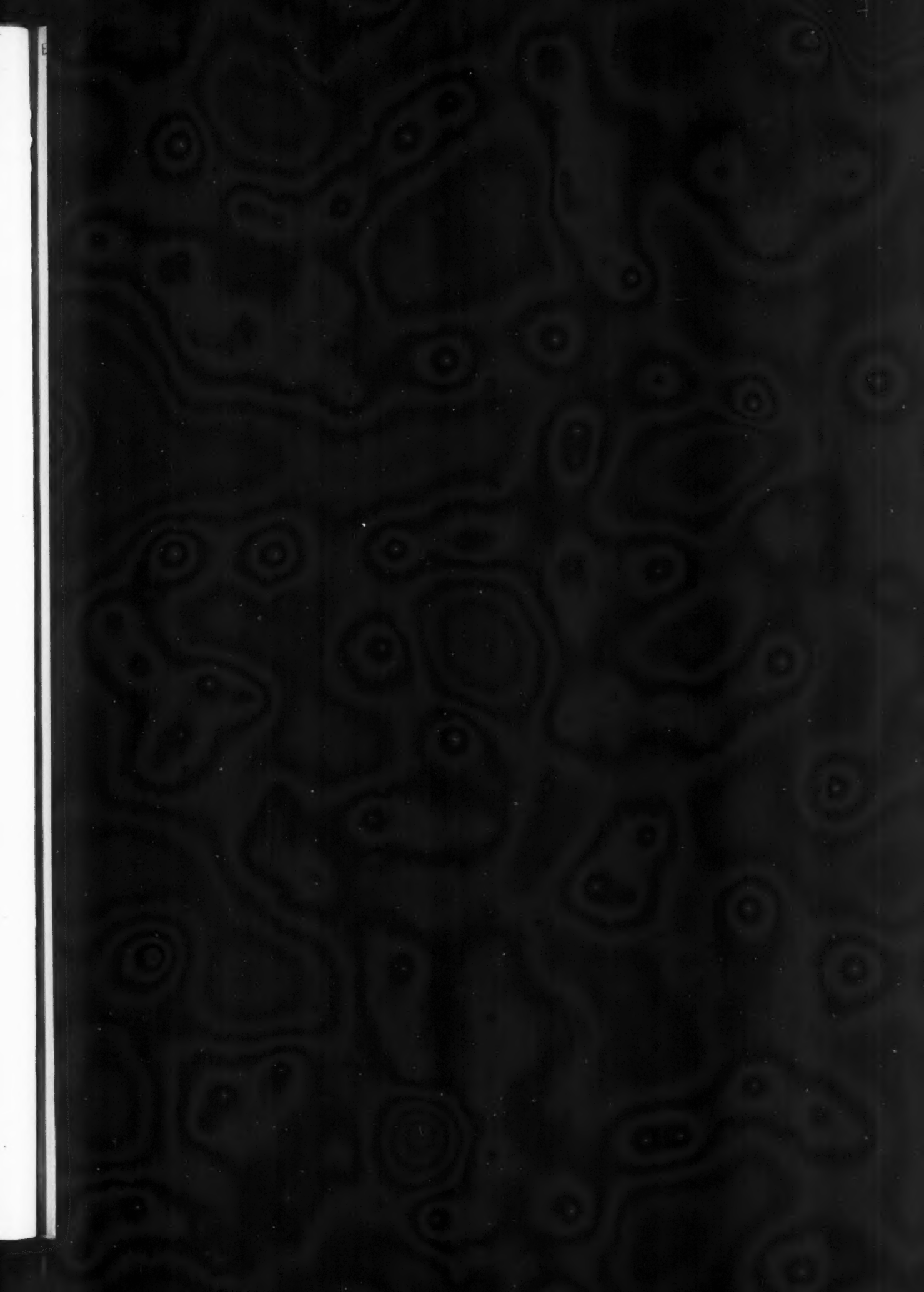
**Stockton-on-Tees.**—Structural alterations to Bath Lane School to provide canteen for the E.C.; borough engineer.

**Trafford Park.**—Works extensions; H. S. Fairhurst & Son, architects, 55 Brown Street, Manchester.

**Tynemouth.**—Flats, Howdon Road; Wm. Stockdale.

**Urmston.**—Works, Trafford Park; Taylor Bros. & Co., Manchester.

**West Hartlepool.**—Building for communal feeding kitchen, for T. C.; F. Durkin, borough surveyor, Municipal Buildings.

**Worksop.**—Erection of maternity block, for Notts. C.C.; county architect, Shire Hall, Nottingham.

**Wythall.**—Works extensions; E. A. Turner, Ltd., Wythall, near Bromsgrove.